P/N 4730-0013-04 Rev B

ULTRAMARK® ULTRASOUND SYSTEM 9 HDI

Field Service Manual

Service Manual 4730-0013-04 Rev A consists of:

4720–0013–04 Rev A (2/96)

August, 1999

A detailed Table of Contents and List of Effective Pages are contained in Page i. Changed or added pages, from the initial manual release, can be identified by the change date located at the bottom of each page. No change date indicates that this page is the original release and has not been changed. A change bar (▌), located in the outside margin of a page, denotes the specific part of a page that was changed at that date. A pointing hand (☞) indicates the portion of a figure that has been revised.

For a list of current documents, refer to the latest revision of the *Active Documents List – Ultramark 9 HDI System,* P/N 4768-0013-01.

ATL
P.O. Box 3003
Bothell, WA 98041-3003

Introduction

Introduction

This manual provides only information most often needed in the field.

Experienced personnel will be able to use accompanying performance testing, and preventive maintenance checklists.

Organization

The manual contains major tab divisions for diagrams, procedures, adjustments, fault isolation, configuration supplement, Operating Notes, Service Bulletins, reference, and parts.

ACTIVE DOCUMENT LIST: lists all active documents pertaining to the Ultramark® 9 HDI Ultrasound System. Listed are active service bulletins, service manuals, operation manuals, translated operation manuals and operating notes.

DIAGRAMS: includes diagrams of system/data paths, power distribution, and cabling.

PROCEDURES: contains information on pre-installation requirements, installation, performance testing, and preventive maintenance.

ADJUSTMENTS: procedures for field authorized adjustments, including adjustment parameters and location diagrams.

FAULT ISOLATION: system self-diagnostics and fault isolation information organized by PCB. Also includes minimum configuration information.

CONFIGURATION: hardware and software compatibility information for specific system configurations.

OPERATING NOTES: contains operating infor-mation not incorporated into the operation manual.

SERVICE BULLETINS: includes copies of all active service bulletins. “Hot Tips” may be added as they are received by the CSR.

REPLACEABLE PARTS: contains illustrated parts listings of parts commonly replaced in the field.

REFERENCE: for information regarding interconnecting cables and connectors used in the Ultramark 9 HDI as well as other miscellaneous information. This section is currently empty.

Manual Usage and Update Information

The Table of Contents and List of Effective Pages have been combined for this manual. There is no List of Illustrations or List of Tables. This will facilitate frequent updating of the manual and allow CSRs to easily determine the effective date of referenced information.

The contents of a manual change package should be inserted as indicated on the cover sheet attached to the package. Changed or added pages can be identified by the change date at the bottom of the affected page. No change date indicates the page is an original

page. Change bars located in the outside margin of the page denote the specific part of a page that was changed at that date. A pointing hand indicates the portion of the figure that has been changed.

Page numbers are divided into three parts. The prefix identifies the system covered by the manual. The middle portion identifies the section of the manual. The suffix indicates the actual page number.

Safety and Precautions

This section provides biological, procedural, environmental, electrical and mechanical safety information.

WARNING statements identify conditions or practices that could result in personal injury or death.

CAUTION statements identify conditions or practices that could result in equipment damage.

Biological Safety

The assessment of the biological effects of diagnostic ultrasound on humans is not complete. Diagnostic ultrasound procedures should be used only for valid reasons, for the shortest period of time, and at the lowest power settings necessary to produce diagnostically acceptable images.

Procedural Safety

WARNING

Do not service or adjust a system unless another person capable of rendering first aid is present.

CAUTION

Do not sterilize scanheads with heat, liquid, gas, or solvents. Do not autoclave or expose to temperatures exceeding 50_C (131_F). Permanent damage may result.

WARNING

Disconnect power source and scanheads prior to cleaning.

WARNING

Inspect the transducer face, housing, and cable before using the instrument. Do not use damaged transducers.

WARNING

Equipment grounding: This equipment is classified Class I, Type B as defined in IEC Standard 601-1 Safety of Medical Electrical Equipment. Electrical shock protection is provided by connecting the instrument chassis to safety ground using the 3-wire power cable provided. This cable must be connected to a properly grounded receptacle. Do not defeat the grounding integrity of the equipment.

WARNING

Shock hazards exist if the system is not properly grounded. The system must be plugged into a hospital-grade outlet.

WARNING

Do not replace components with power connected. Under certain conditions, dangerous voltages may exist with power removed. Disconnect power and discharge circuits before touching.

WARNING

Fuse replacement is to be done by qualified service personnel only. Avoid electric shock and fire hazard by using proper fuses.

CAUTION

Verify the system is set to proper power source voltage and the cart power plug mates with the power receptacle.

WARNING

Additional hazards may be introduced by using substituted parts or modified instruments.

WARNING

Using accessories not recommended by ATL may cause electrical shock or other unsafe conditions.

CAUTION

Verify circuit boards and components are dry before applying system power.

CAUTION

This equipment contains components which are electro-static sensitive. Proper static procedures, protection and equipment must be used prior to opening and during handling of this equipment. Failure to use ESD procedures will cause damage to these components. Such damage to components is not covered by ATL warranties.

Environmental Safety

WARNING

Do not operate a system in the presence of flammable gases or anesthetics or in an oxygen enriched environment (i.e., in an explosive atmosphere). An explosion could result.

Mechanical Safety

CAUTION

Use caution when transporting the system over uneven surfaces, including entry to or exit from elevators.

WARNING

Stacking equipment on the system, other than ATL specified equipment, can cause it to become mechanically unstable.

CAUTION

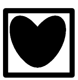
Do not use esters or ketone solutions to clean parts. Discoloration (or worse) will result.

System Safety Symbology

Document IEC601-1, International Electrotechnical Commission: Safety of Medical Electrical Equipment, classifies patient connections according to whether the outer enclosure is grounded or floating (non-conducting). The classifications are shown below.

Grounded chassis. Protection against electrical shock is provided by connection of chassis to the safety ground (IEC601-1 Type B).

Isolated patient connection (IEC 601-1 Type BF).



Isolated patient connection (IEC 601-1 Type CF).

I O

I and O on circuit breaker and power switch represents ON and OFF, respectively.

This symbol identifies safety note. Be sure you understand the function of this control before using it.

IPX–1

Drip-proof hand-held appliance (transducer assembly). This instrument may be safely handled with wet hands.

Identifies protective earth ground (located next to ground stud on the rear panel).

Identifies the point where the system safety ground is fastened to the chassis.

The following are internal symbols (for reference only):

Identifies high voltage components operating above 1000 VDC or 1500 VAC.

1A Block Diagrams

NOTE: The block diagrams in this section include PCBs for all options available for each PCB configuration. Refer to the following notes as appropriate.

- The Doppler Acquisition PCB is installed only if the system has steered CW or TCD.

- The Motor Controller PCB is installed only if the system has A6–3 scanhead capabilities.

- Dual IFOM PCBs are installed only on ESP systems. A single IFOM PCB is installed in A16 for Non-ESP systems.

NOTE: Many PCBs used in Ultramark 9 HDI systems now have multiple reference designators. Refer to **Section 5C** for PCB slot locations.

ACQUISITION GROUP

PROCESSOR GROUP

ARRAY SCANHEADS

CW PROBES

MECHANICAL

MOTOR CONTROLLER 7500–0617 [1]
* Provides WAM motor drive
* Decodes transducer position
* Generates column request to front end to initiate transmit burst
* SCIP bus interface
* 4 independent power amplifiers with auto–shutdown if preset power limits are exceeded

2D ACQUISITION, (MFE1) 7500–0655 [3]
* Generates 120 MHz system clock [2]
* Part of static CW Doppler transmit and receive preamp
* General I/Q reference clock
* Static TCD pulser and preamp

DOPPLER ACQUISITION, (MFE2) 7500–0615
* Required for steered CW, TCD, and static CW
* Receives RF signals from beamformer or MFE1
* Filters and amplifies the RF signal
* Mixes RF down to baseband frequency
* Low and high pass filtering of baseband frequency
* Audio amplification
* A/D conversion
* Digital control of filtering and amplification

ARRAY

FRONT–END CONTROLLER, 7500–0570
7500–0754
* Generates SCIP Bus master clock for ADDA, IFO, MMC, FEC, and CPU PCB's
* TGC generation
* Header generation
* High PRF
* PRI sequencing
* Generates transmit and receive delays
* Provides all control and PRI timing functions for various front ends
* Provides all system backplane clocks
* The 7500–0754 PCB has 120 MHz system clock when used in non–steered CW only

SCANHEAD SELECT, 7500–0629
* Scanhead interface: linear and phased Array path via relay to Channel PCB's
* Scanhead personality interface
* TGC Summation Bus
* CW Summation Bus
* Steered CW path via coax to MFE2

SCANHEAD SELECT DAUGHTER 7500–0636
* Decodes control signals from FEC to Scanhead Select PCB and pulser power supplies
* Monitors high voltage and +12V on Scanhead Select PCB
* Interface decoded scanhead personality data from Scanhead Select PCB back to FEC PCB
* Decodes control data from FEC to HV Mux ICs in L10–5 scanhead
* Decodes control data from FEC to relays in Scanhead Select PCB
* S/H temperature monitor
* TGC voltage monitor

CHANNEL, 7500–0544
7500–0755
7500–0772
* 128 transmit pulser elements (16/Channel PCB)
* 128 channel receive apertures
* Echo Summation
* Summed Steered CW to Scanhead Select Interface
* TGC waveform generation
* All Channel PCB's required for scanhead operation but not required for scanhead ID.
* Applies transmit and receive delays
* Applies TGC to Echo RF data

A ECHO BUS

B ECHO BUS

IMAGE BUS MEMORY, 7500–0405
7500–0722
* 256 pages of system memory for 7500–0405 and 7500–0722 PCB's
* 1024 pages of system memory for 7500–0569 PCB
* Stores 2D Cineloop, Doppler, and Doppler data review
* Manages transfer of Doppler,Color,M–Mode, and ECG data to Image Bus
* Generates timing signals for memory
* Determines priority of PCB's requesting memory time
* Refresh timing
* Image Bus control

IF OUTPUT, 7500–0592 (Stand–alone)
7500–0783 (Stand–alone)
* Color samples from RF Data
* Demodulation and bandwidth limiting
* Array sample volume generation
* Doppler Cineloop Limits,Reset, and Frame Number
* Line density
* Echo detection and compression
* 2D dynamic range
* Self–test capability
* Transfers color and Pulsed Doppler to Image Memory
* CW Doppler memory addressing
* Participates in 2D depth scaling
* Receives beamformed RF data and performs demodulation and bandpass filtering to produce in–phase and quadrature complex data samples
* Creates Image Bus addresses for a color flow test pattern

IF OUTPUT MASTER/SLAVE, 7500–0783
* Same functions as 7500–0592 IFOM
* Doubles through–put
* Used only on systems with ESP capability

ECHO INPUT MODULE, 7500–0692
* Final 2D and M–Mode depth scaling
* Cineloop memory addressing
* M–Mode enhance
* Receives detected echo data from array front end, processes data, and writes processed data to image memory
* Needed for generation of timing signals sent through M–Mode/Physio to the Scrolling Graphics Display

ECG ISOLATION, 3500–1319
* ECG receiver and preamp
* Pulse and phono receiver and preamp

ADVANCED DIGITAL DATA ANALYZER, 7500–0603
* FFT processing
* Array Pulsed Doppler wall filters
* Doppler audio
* Color capture
* Doppler audio synthesis and output
* Doppler signal optimization
* Overall supervision and control of Doppler processing
* Image memory processing tasks (edge detection, Doppler history reconstruction, and color capture)
* Spectral estimation and display processing
* Color Persistence
* ADDA is the only PCB to use Image Bus for checksum

M–MODE/PHYSIO PROCESSOR, 112–25337
7500–0671
* M–Mode Zoom
* Physio processing: ECG, pulse, phono displays
* Acquires M–Mode data and performs temporal averaging to produce visible M–Mode sweep rates
* Digitizes physiological information from ECG Isolation PCB, attaches it to processed M–Mode and sends it to Image Memory
* Generates timing signals for Color M–Mode and sends them to Scrolling Graphics Display

COLOR DATA PROCESSOR, 7500–0602
7500–0829
* Array color wall filter
* Dynamic Motion Differentiation
* Spectral Estimator interface
* Removes Doppler signals coming from stationary or slow moving structures
* Eliminates high amplitude, low frequency echoes

SPECTRAL ESTIMATOR, 7500–0382
* Generates Color Flow display parameters
* Stores color data in Image Memory
* Estimates frequency, velocity, and strength of the returned signal
* Interface with the CDP
* Sends color frame interrupt to system CPU

IMAGE BUS

AUDIO BUS

[1] Refer to Tables 5C–1 and 5C–2 for PCB slot locations.

[2] Generates 120 MHz clock on ST CW systems and on Non–steered CW systems with the 7500–0570 FEC. On newer systems without ST CW/CW, the 2D Acquisition will not be installed. In this case, the 120 MHz clock originates from the 7500–0754 FEC.

[3] The MFE1 is not in the steered CW data path. It generates static CW/TCD transmit pulses and is in receive data path for static CW/TCD. For steered CW, the system uses more than one element for TX and RX. Steered CW transmit and receive signals must be routed thru the beamformer to provide summation.

10 ES01–B01 19

Figure 1A–1. UM–9 HDI PCB Functions (1 of 2)

CONTROL GROUP

PHYSIO SENSORS

CONTROL BUS

CONTROL INTERFACE, 7500–0528
7500–0757
* LED Function
* Interface between front panel controls and system CPU
* I/O port for MIC
* Self test feature
* Soft click audio output

Mode Switch PCB, 7500–0441

Footswitch PCB
* Controls footswitch operation

Tact Switch PCB, 7500–0436
* Front panel pushbuttons, status LED's, control panel speaker, rotary controls, encoder controls
* Switch daughterboard PCB provides encoder controls (2D, DOPPLER, and COLOR GAIN control)

Trackball Switch PCB, 7500–0442
* S1 (Enter), S2 (Set), Trackball

SYSTEM CPU, 7500–0573
7500–0749
* Hard disk control
* Floppy disk control
* System controller (32–bit microprocessor)
* System clock
* Measurement and Analysis
* RS–232 interface
* Monitors critical analog voltages
* Real–time clock and backup
* Stores user defaults

LAMBDA POWER SUPPLY
* Generates +/– 48 volts to pulser

PULSER POWER SUPPLY, 3500–1131
* Generates pulser voltage
* Receives +/– 48V and converts to transducer pulser voltage which is variable to +/– 105V, depending on the scanhead type, system type, and mode of operation

DIGITAL POWER SUPPLY (L.H. RESEARCH)
* Converts 120 VAC into +5 VDC, –5.2 VDC, and +/– 12 VDC

ANALOG POWER SUPPLY
* Six discrete power supplies which convert 120 VAC to +6V, –6V, +15V, –15V, +16.5V, –16.5V

1 Frame Grabber functional only on systems with 17.X software and up.

2 Frame Grabber functions of the Advanced Frame Grabber PCB functional only on systems with 17.X software and up.

IMAGE BUS

AUDIO BUS

IMAGE GROUP

2D SCAN CONVERTER
* 5 PCB set
* Formats ultrasound input data into sector or linear rectangular–coordinate output synchronized to TV raster timing
* Frame averaging (Dynamic Contrast Enhancement)
* 2D pan zoom
* Image orientation (reversal and inversion)
* Interpolates image display data
* Sets display boundaries

S.C. Output Address Generator PCB (B/W and Color) 7500–0499
* Uses CPU timing and control data from the system CPU and the respective Interface PCB (B/W or Color) to create row and column display addresses

S.C. Interface PCB (B/W or Color) 7500–0557
* Transfers control messages from the Image Bus to the respective Output Address Generator PCB and the Dual Buffer Memory PCB
* Transfers image data from Image Memory to the Dual Buffer
* Receives and interpolates display data from the Dual Buffer Memory PCB and transfers it to the Video Bus
* Performs frame averaging function (Dynamic Contrast Enhancement)

Dual Buffer Memory PCB 7500–0558
* Provides image data storage for the 2D scan converter module
* Modifies the display address from the Output Address Generator PCB, and uses that address to select the correct data from the memory array for transfer to the Interface PCB

DISPLAY GRAPHICS, 7500–0514 COLOR
* Scrolling spectral display
* Color M–Mode display
* Doppler ECG display

MASTER SCROLLING GRAPHICS, 7500–0515
* 2D ECG display
* Scrolling M–Mode display
* M–mode ECG display

SCROLLING GRAPHICS DISPLAY, 7500–0864
* Combines all functions of Display Graphics (7500–0514) and Master Scrolling Graphics (7500–0515) Refer to PCB functions listed above for each of these PCB's.

FRAME GRABBER, 7500–0556 1
* 4 on 1 Save–Recall Format (only on systems without Advanced Frame Grabber)
* VCR Freeze Frame
* Patient Directory
* Hidden Digital

ADVANCED FRAME GRABBER, 7500–0554
* Combines all functions of Display Graphics (7500–0514) and Master Scrolling Graphics (7500–0515) and Frame Grabber (7500–0556) Refer to PCB functions listed above for each of these PCB's. 2
* Grabs video data and stores in Image Memory
* Retrieves video data from Image Memory for display
* Scrolling graphics for M–Mode, Doppler, ECG and Physio
* Retrieves Hidden Digital information from VCR playback signal

VIDEO BUS

DISPLAY GROUP

ADVANCED VIDEO PROCESSOR, 3500–1200 (NTSC)
3500–1201 (PAL)
3500–1444 (PAL)
* All non–scrolling general purpose graphics
* Grayscale/color mapping
* Generates RGB signals
* Image processing curves
* Doppler grayscale curves
* All system video timing
* Graybar/Colorbar generator
* VCR remote control and frame grab sync
* Audio preamplification
* Hidden digital overlay for tape directory
* Audio buffer mute control
* Color vs. echo overwrite

→ VIDEO MONITORS
→ EXTERIOR VIDEO MONITOR
→ HARDCOPY
→ FRAME SYNC

REAR PANEL,
3500–1257(NTSC)
3500–1256(PAL)
3500–1511(NTSC/PAL)
* Video switch matrix
* Video sync distribution
* RS–232/422 port
* PAL/NTSC generation
* Video Format Converter PCB, or Video Encoder/ Decoder PCB used as daughter boards (NTSC or PAL) 7500–0506/0758
* Video output buffer
* Volume control interface (12V)
* Receives 3 different RGB video signals
* Accepts, buffers and distributes video signals
* Provides DC restored video to the AVP for frame grabbing

→ VCR

AUDIO BUFFER, 7500–0433
* Volume control
* Headphone audio amplifier
* Speaker audio amplifier
* Real time right and left Doppler audio
* VCR playback of right and left channel Doppler audio, and right channel microphone audio

BACKPLANE MOTHERBOARD, 7500–0588
7500–0677
* Signal distribution
* Structural support
* Power distribution
* Ground plane
* Multi–layer PCB

FAN SPEED CONTROLLER, 2100–0679

10 ES01–B02 15

Figure 1A–1. UM–9 HDI PCB Functions (2 of 2)

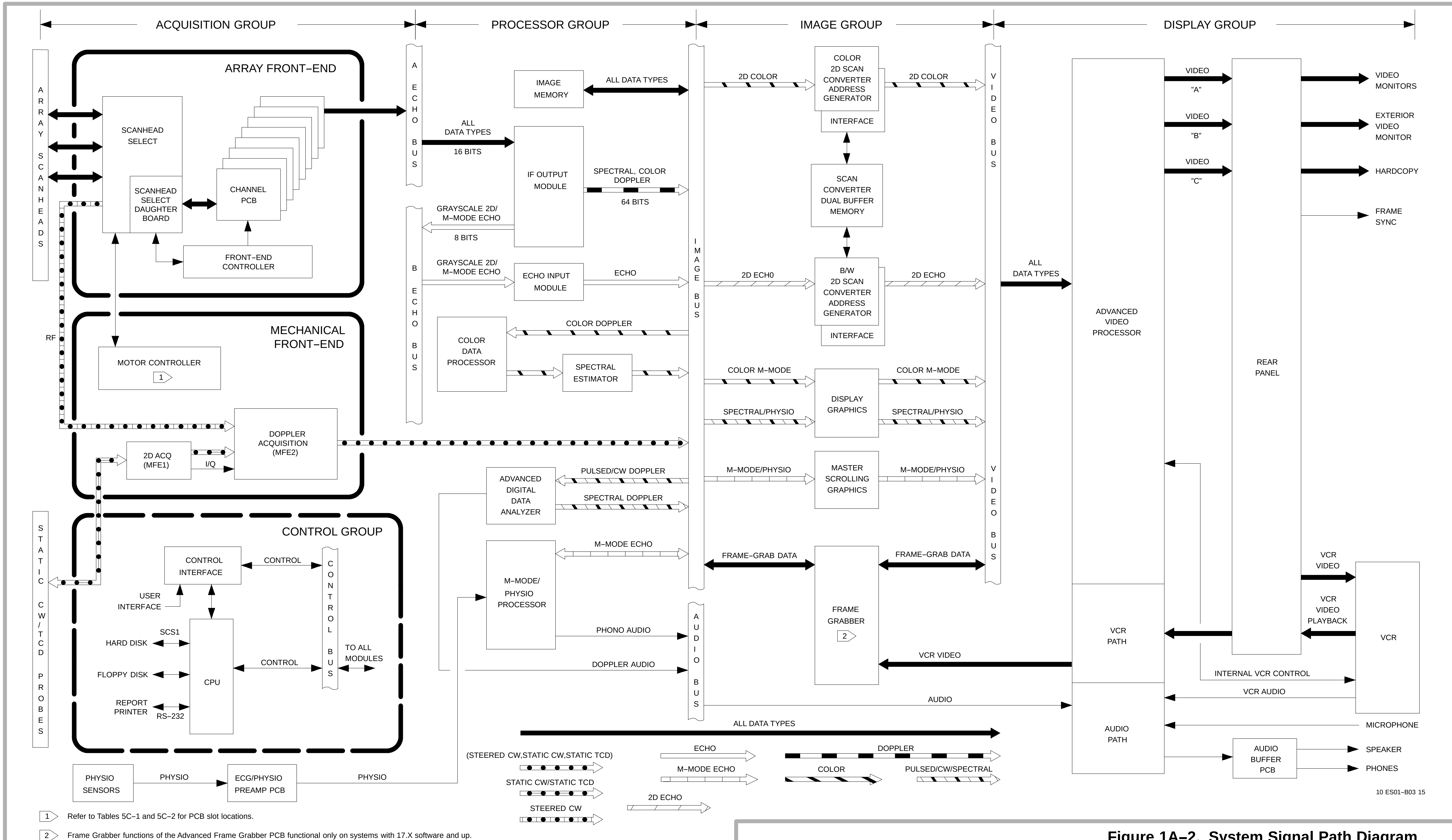


Figure 1A–2. System Signal Path Diagram (Systems with 7500–0588 or 7500–0677 Motherboards)

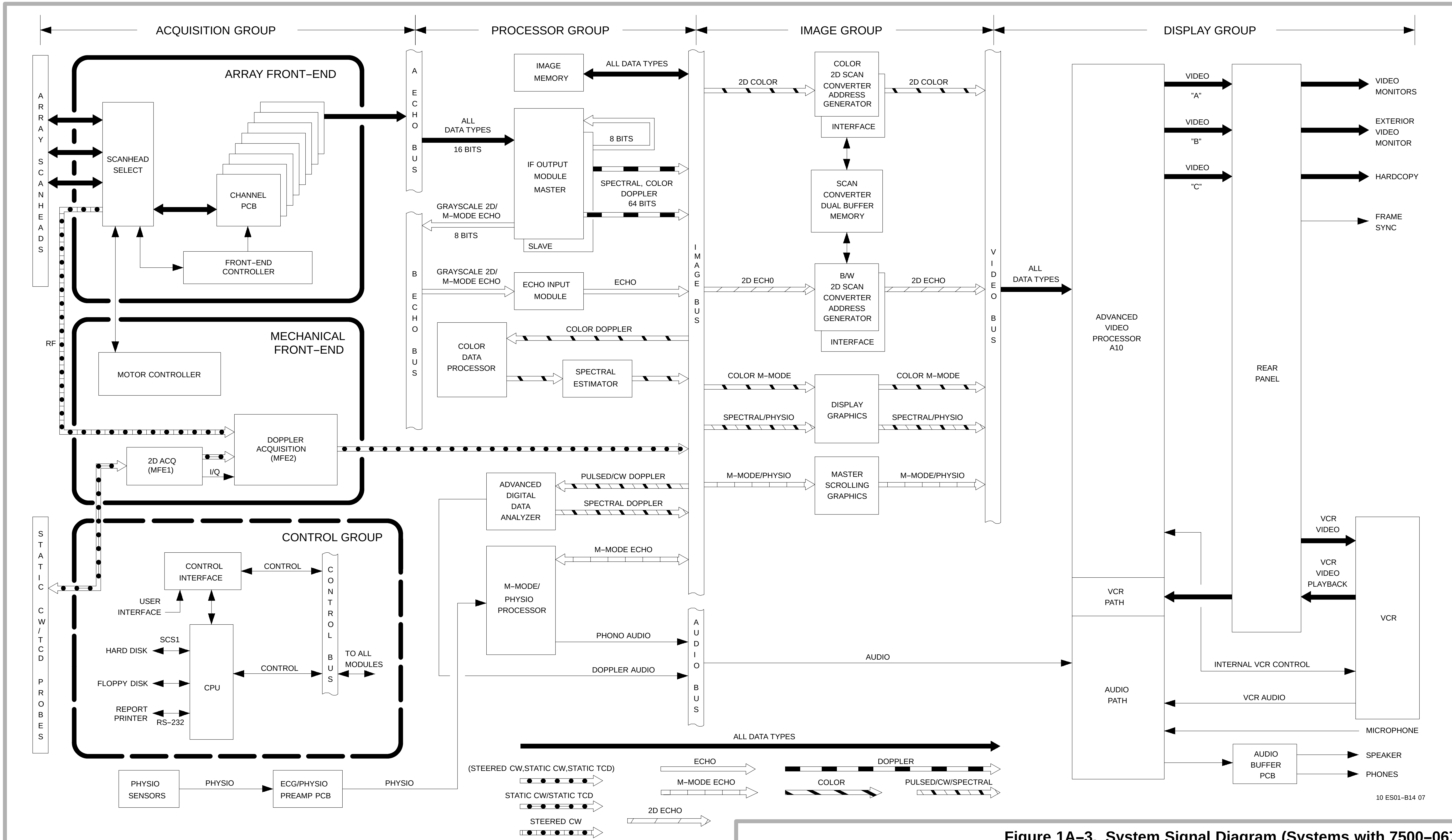


Figure 1A–3. System Signal Diagram (Systems with 7500–0677 Motherboard and Scrolling Graphics Cards only)

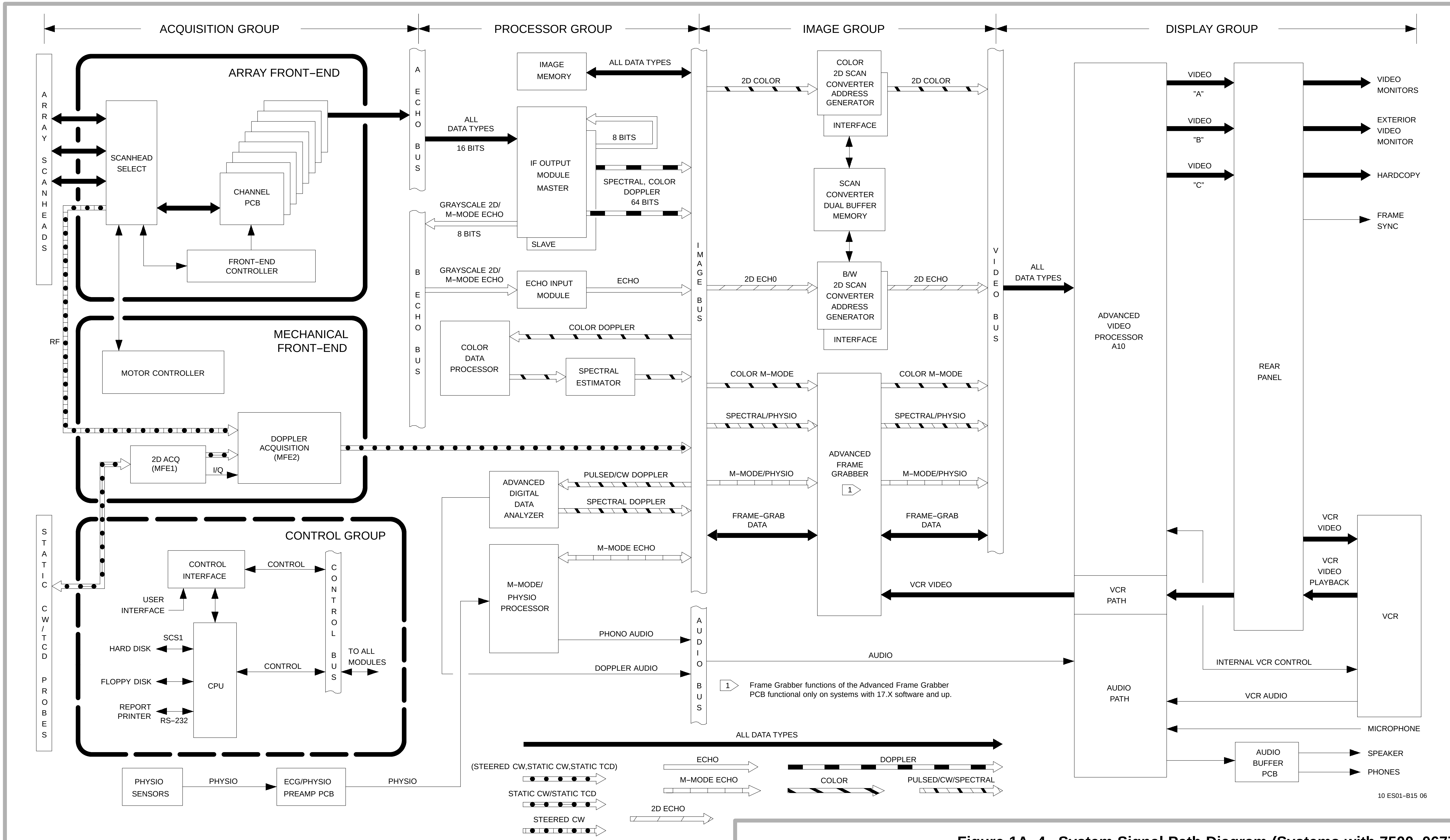


Figure 1A–4. System Signal Path Diagram (Systems with 7500–0677 Motherboard and Advanced Frame Grabber)

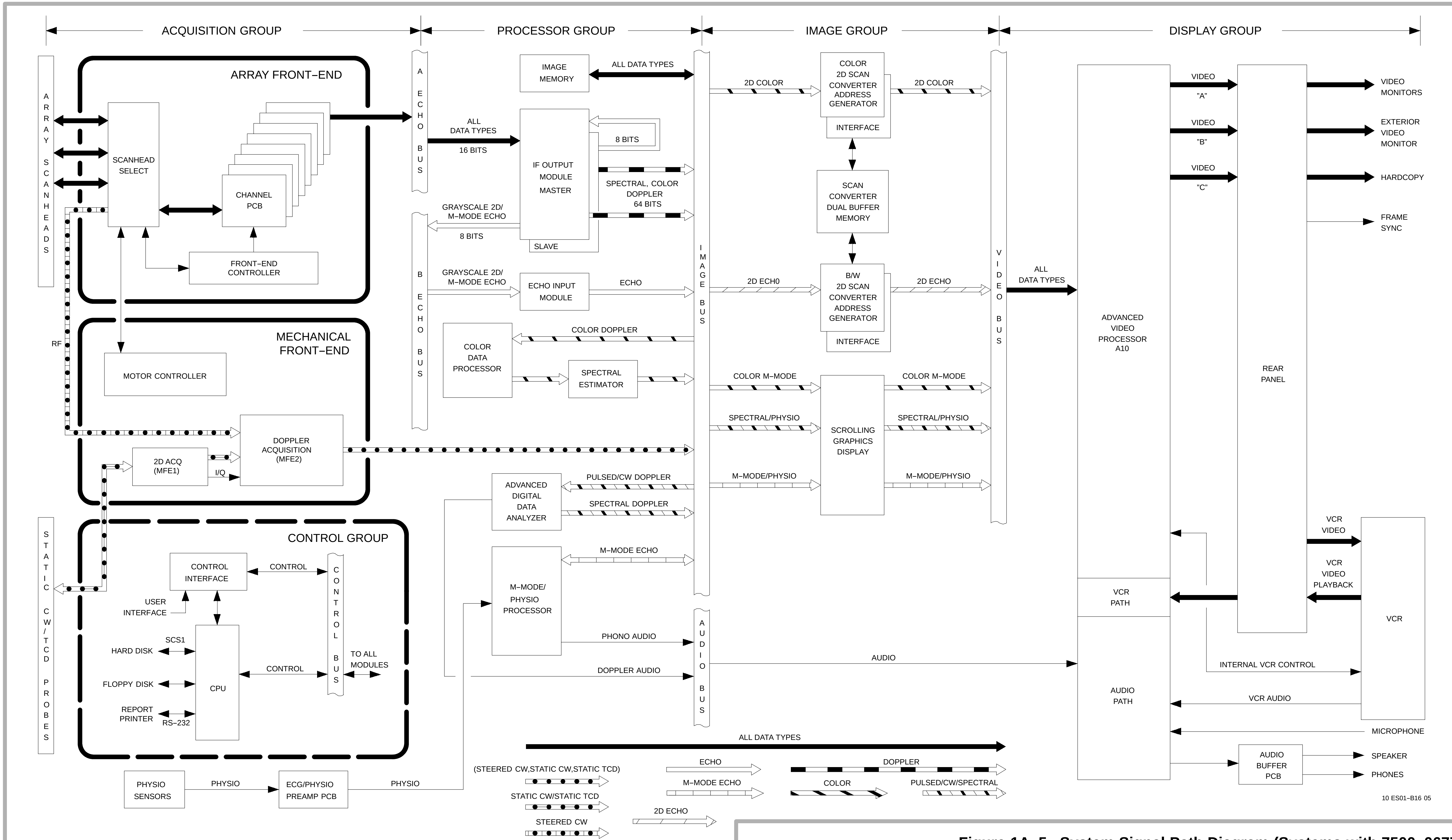


Figure 1A–5. System Signal Path Diagram (Systems with 7500–0677 Motherboard and Scrolling Display only)

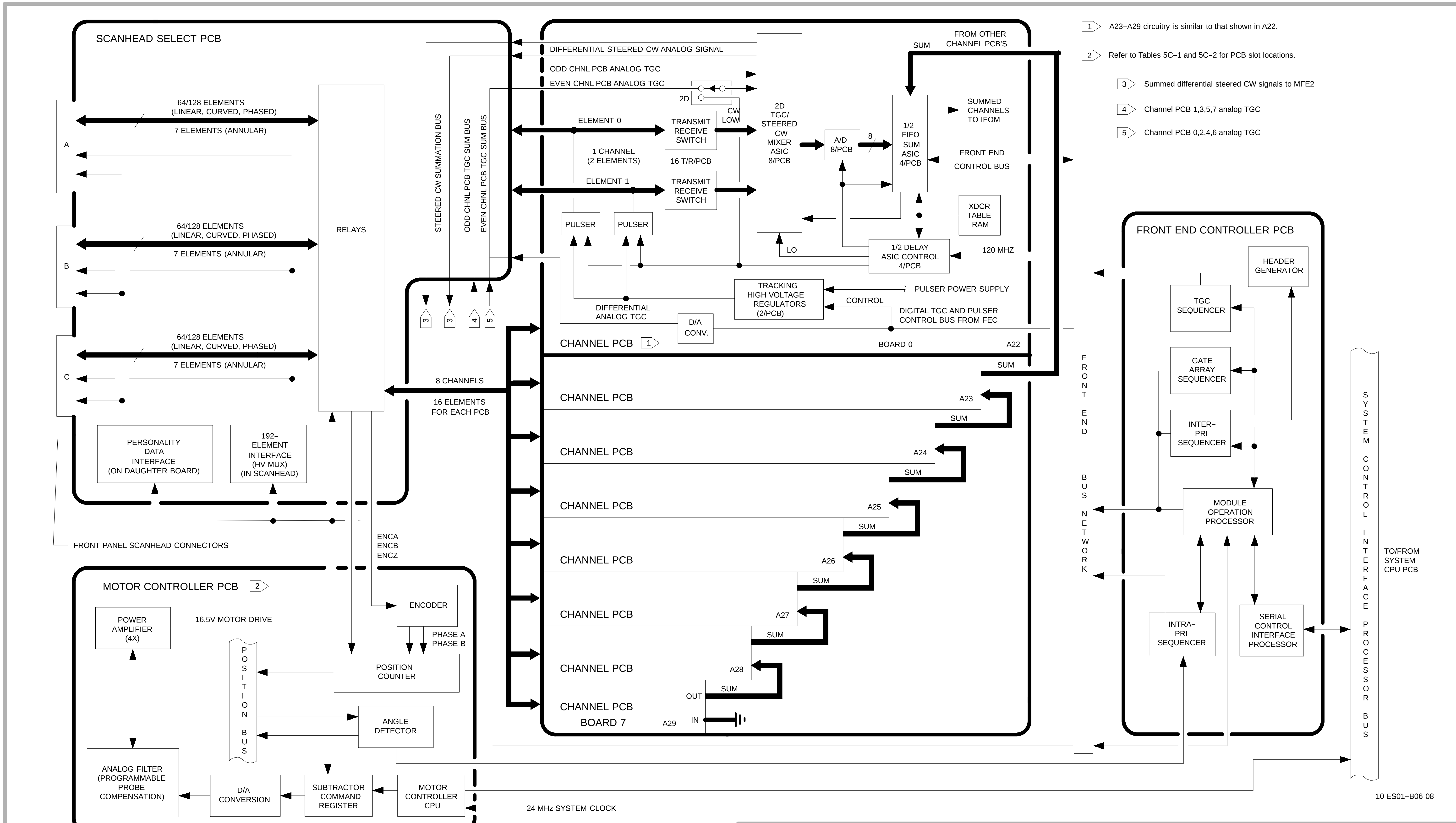


Figure 1A–6. Digital Beamformer and Motor Controller Block Diagram

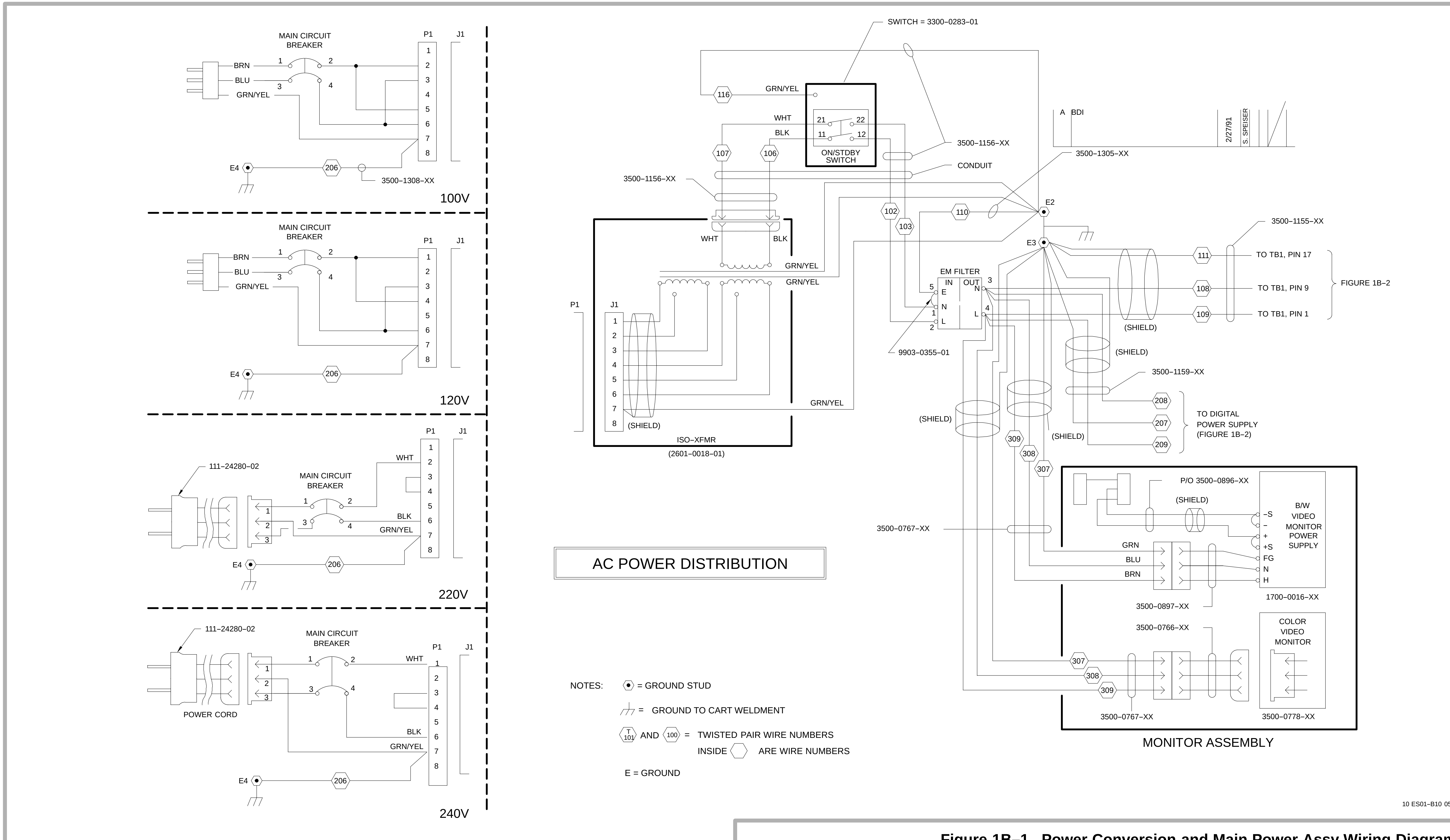


Figure 1B–1. Power Conversion and Main Power Assy Wiring Diagram

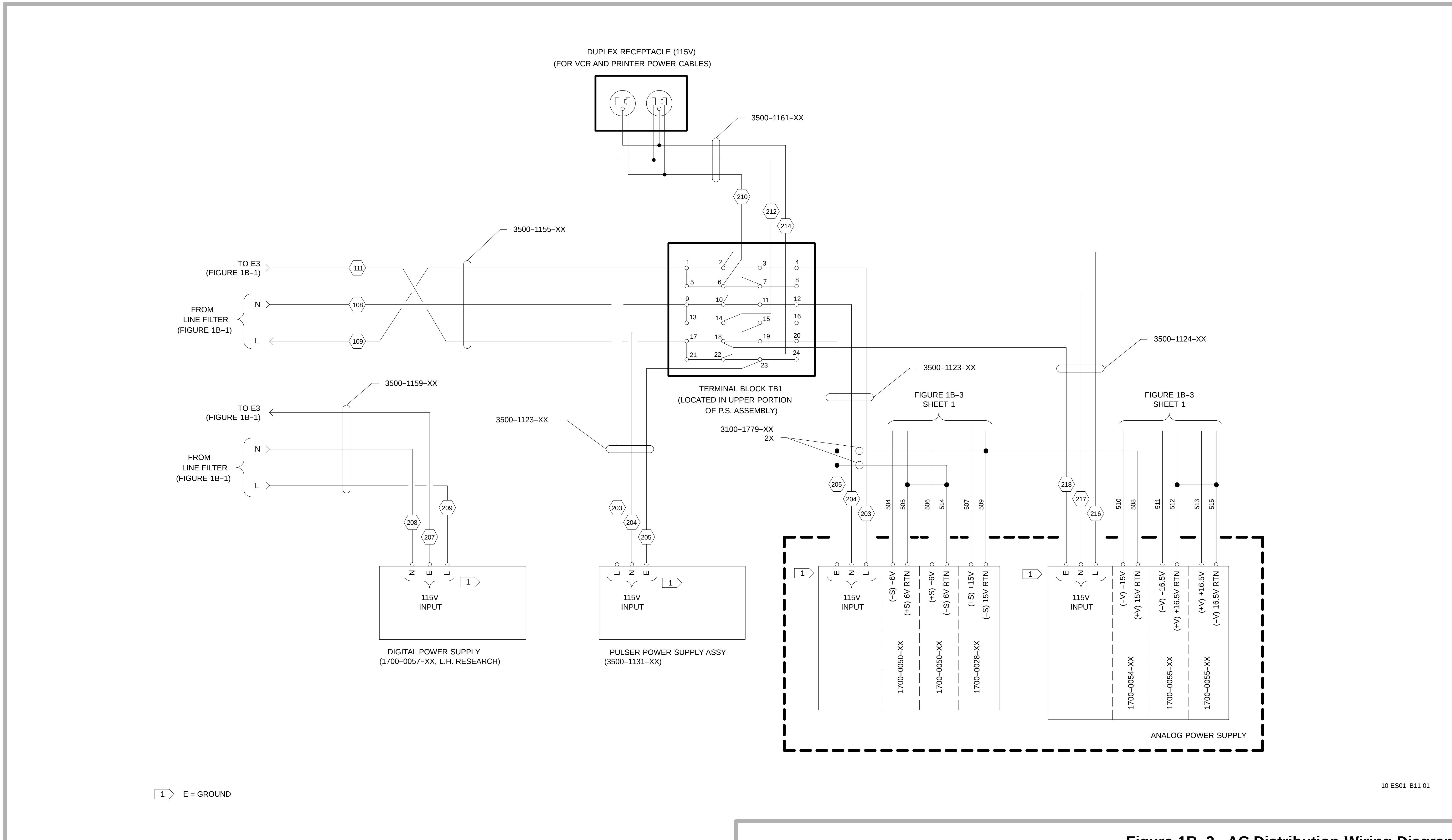
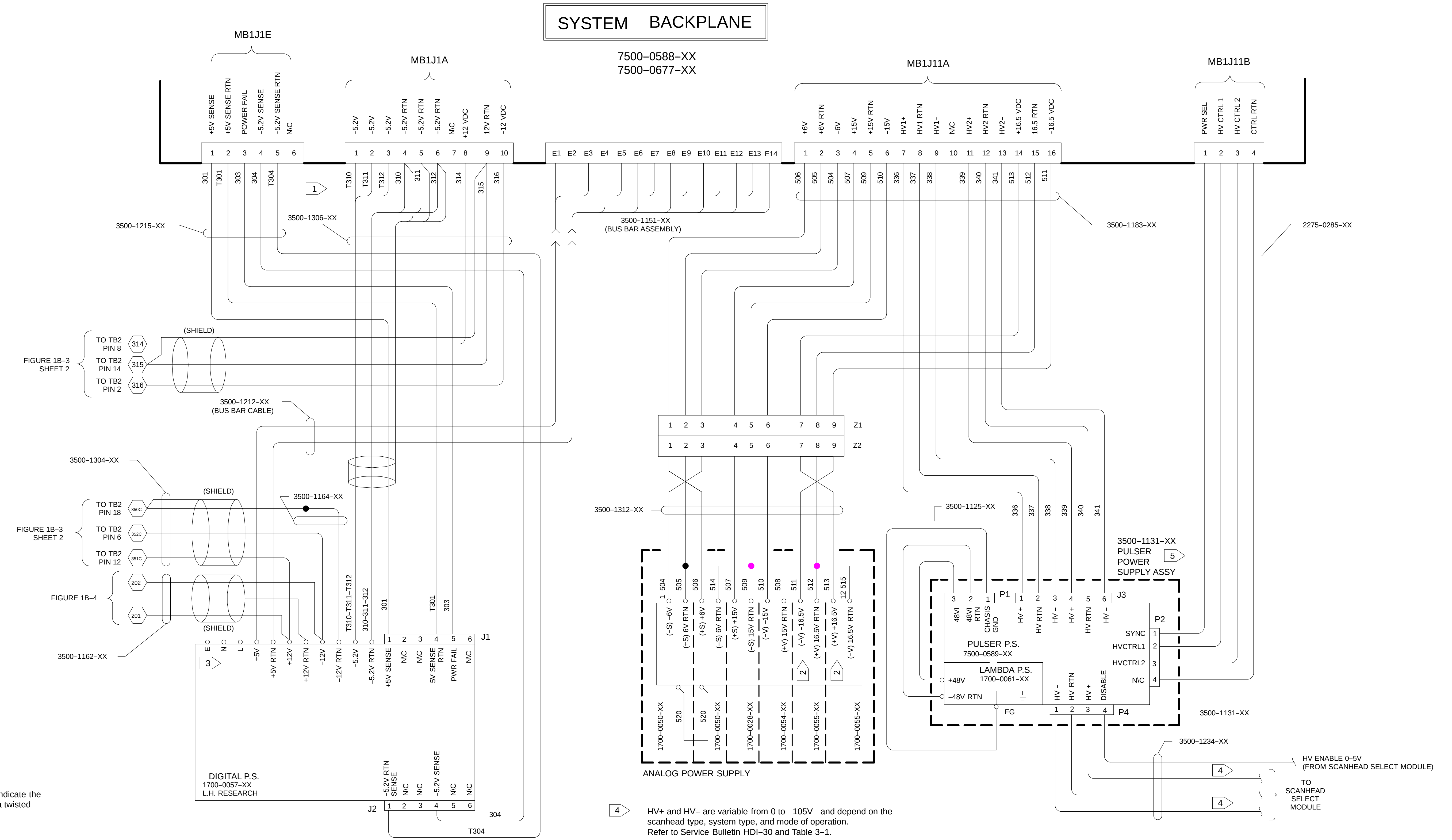


Figure 1B–2. AC Distribution Wiring Diagram



1 "T" numbers indicate the white wire of a twisted wire pair.

2 16.5V is supplied to A16/A18 Motor Controller. On systems with the 7500–0677–XX Motherboard, install the Motor Controller PCB only in slot A18 and the Doppler Acquisition PCB (MFE2) only in slot A19.

3 E = GROUND

4 HV+ and HV– are variable from 0 to 105V and depend on the scanhead type, system type, and mode of operation. Refer to Service Bulletin HDI–30 and Table 3–1.

5 3500–1131–XX comprises 7500–0589–XX and 1700–0061–XX.

Figure 1B–3. DC Distribution Wiring Diagram (1 of 3)

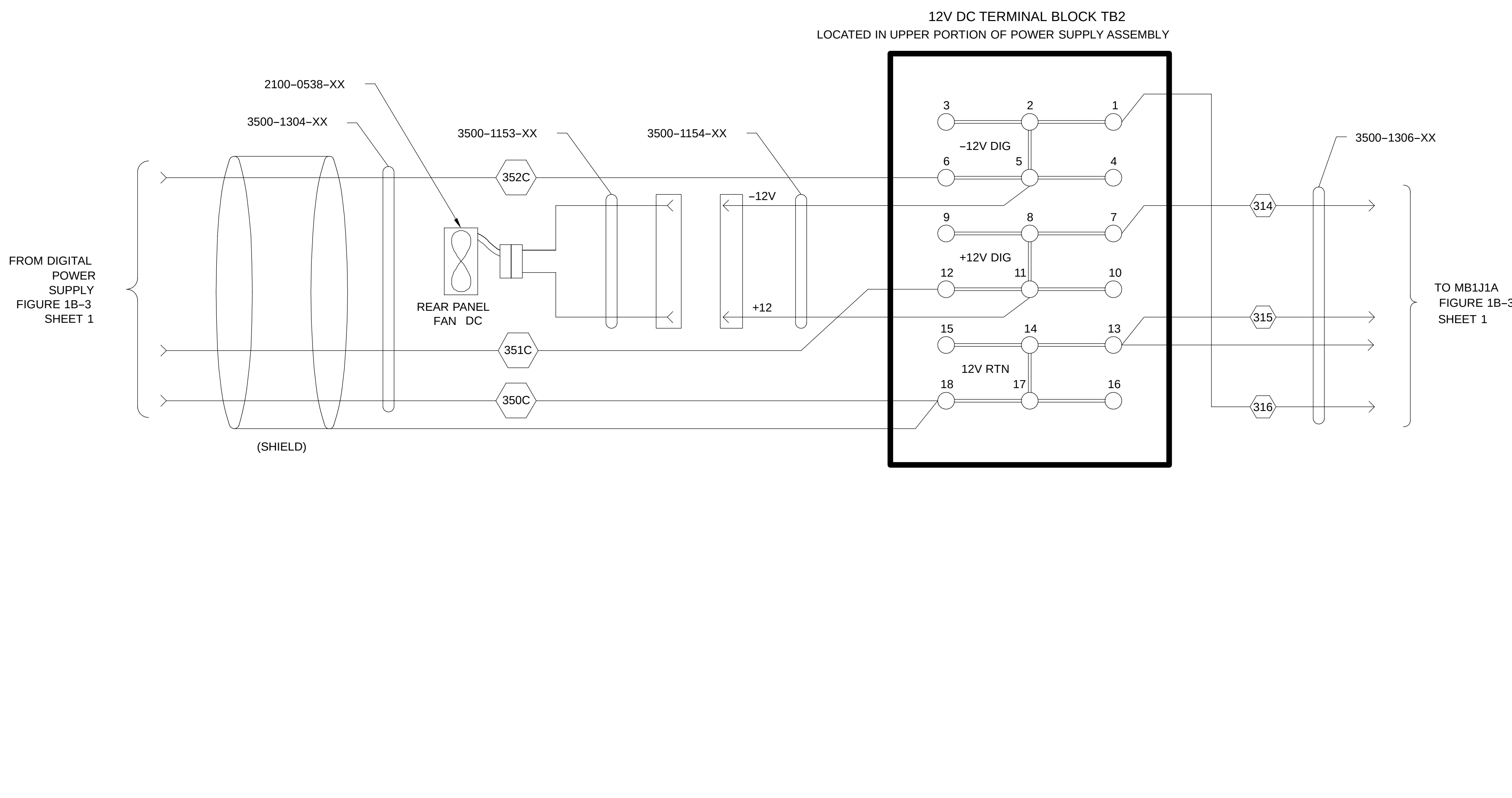


Figure 1B–3. DC Distribution Wiring Diagram (2 of 3)

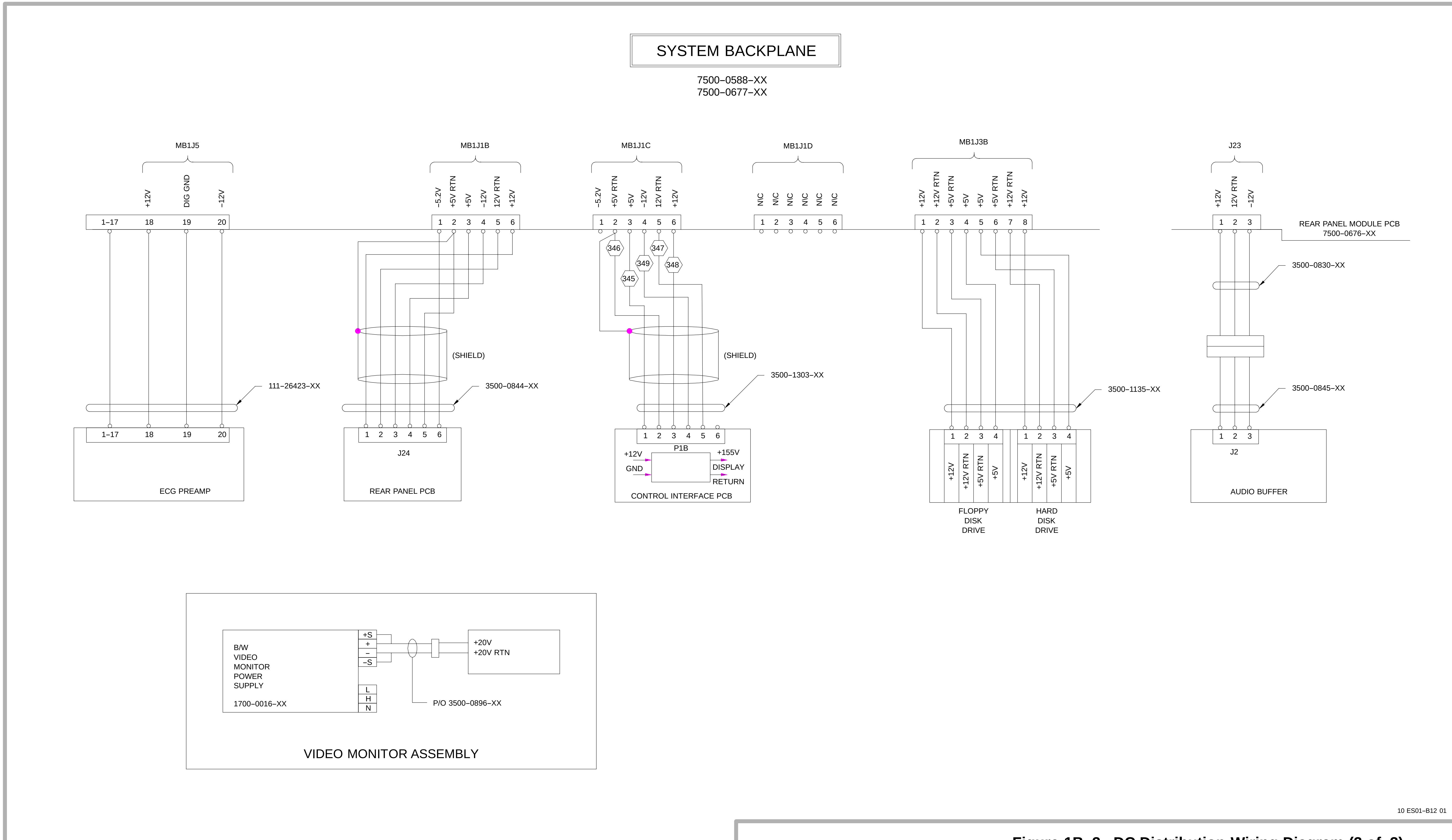


Figure 1B–3. DC Distribution Wiring Diagram (3 of 3)

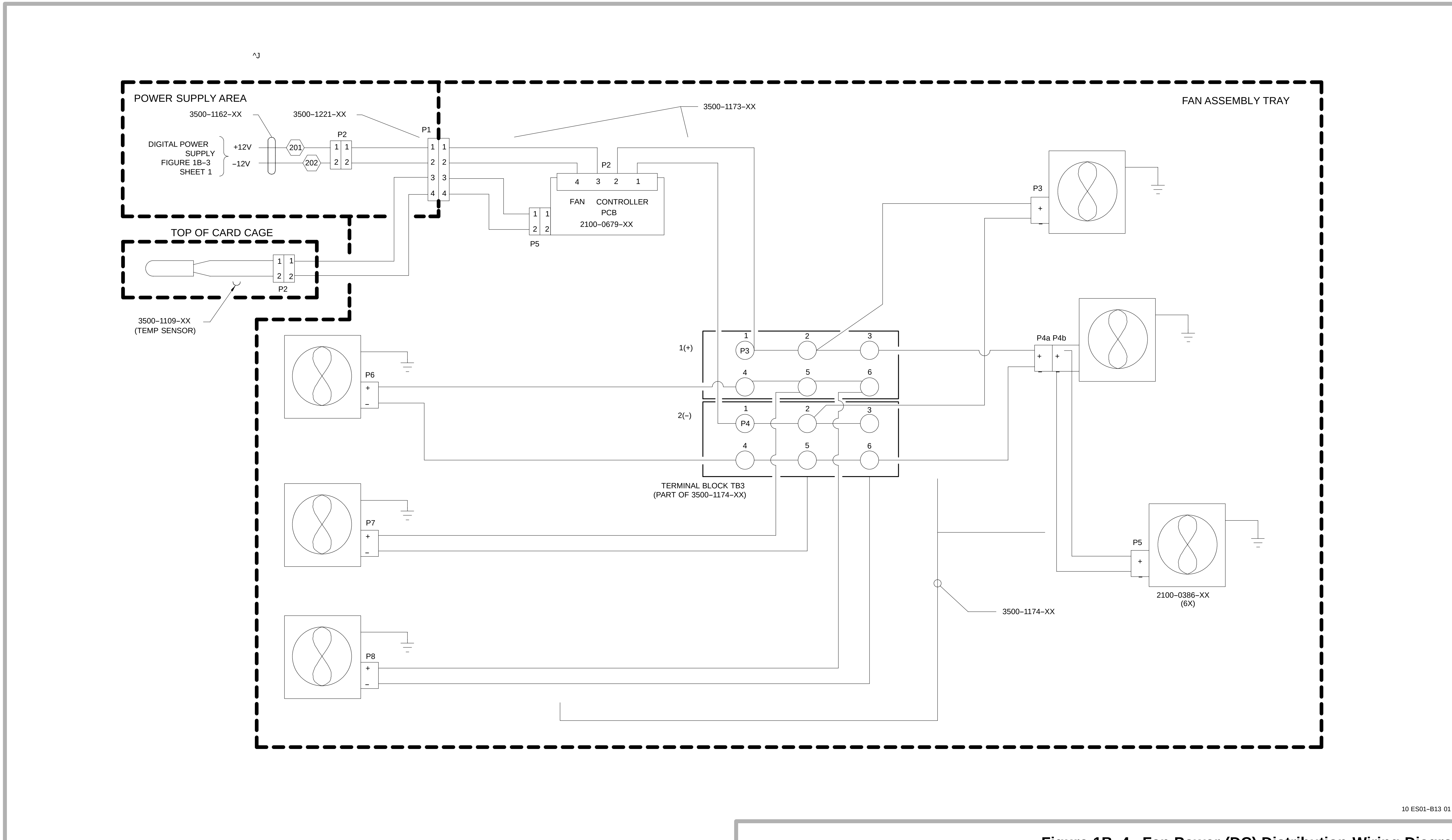


Figure 1B–4. Fan Power (DC) Distribution Wiring Diagram

NOTE: In the following table captions, where there are two slot locations separated by a slash, the slot locations correspond to the -0588 and -0677 motherboards respectively. Where there is only one slot location, it corresponds to both motherboards.

Table 1B–1. Power Distribution: A1/A12, A3/A1, A4/A7

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		27A, 29A, 29B, 29C, 30C, 32A, 32B, 32C
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 16A, 19C, 21A, 21B, 21C, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B

Voltage	Jack	Pins
+5	P3	31A, 31B, 31C
D–GND		32A, 32B, 32C

Table 1B–2. Power Distribution: A2/A11

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		1A,1B,1C, 2B, 3B, 4B, 5B, 27A, 29A, 29B, 29C, 30C, 32A, 32B, 32C
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 16A, 19C, 21A, 21B, 21C, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5	P3	31A, 31B, 31C
D–GND		32A, 32B, 32C

Table 1B–3. Power Distribution: A5/A9, A6/A8

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		8B, 9A, 10A, 10C, 11A, 11C, 12A, 12C, 13C, 14C, 27A, 29A, 29B, 29C, 30C, 32A, 32B, 32C
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 16A, 19C, 21A, 21B, 21C, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5	P3	31A, 31B, 31C
D–GND		32A, 32B, 32C

Table 1B–4. Power Distribution: A7/A10

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		1A, 1C, 16B, 27A, 29A, 29B, 29C, 30C, 32A, 32B, 32C
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 16A, 19C, 21A, 21B, 21C, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5	P3	31A, 31B, 31C
D–GND		32A, 32B, 32C

Table 1B–5. Power Distribution: A8/A2, A9/A3

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		2A, 13A, 20A, 27A, 29A, 29B, 29C, 30C, 32A, 32B, 32C
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 16A, 19C, 21A, 21B, 21C, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5	P3	31A, 31B, 31C
D–GND		32A, 32B, 32C

Table 1B–6. Power Distribution: A10/A4, A11/A5, A12/A6

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		2A, 13A, 20A, 27A, 29A, 29B, 29C, 30C, 32A, 32B, 32C
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 16A, 19C, 21A, 21B, 21C, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5	P3	31A, 31B, 31C
D–GND		32A, 32B, 32C

Table 1B–7. Power Distribution: A13, A14, A15/A17

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 6A, 6B, 6C, 9A, 12A, 15A, 18A, 24A, 27A, 29A, 29B, 29C, 30C, 32A, 32B, 32C
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 4A, 16A, 19C, 21A, 21B, 21C, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5	P3	31A, 31B, 31C
D–GND		32A, 32B, 32C

Table 1B–8. Power Distribution: A16/A18

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 9A, 12A, 15A, 18A, 24A, 27A, 29A, 29C, 30C, 32A, 32B, 32C
+MV		4A, 4B, 4C
–MV		5A, 5B, 5C
MV RTN		6A, 6B, 6C
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 4A, 19C, 21A, 21B, 21C, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5	P3	31A, 31B, 31C
D–GND		32A, 32B, 32C

Table 1B–9. Power Distribution: A17/A16

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 6A, 6B, 6C, 9A, 12A, 15A, 18A, 24A, 27A, 29A, 29C, 30C, 32A, 32B, 32C
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 4A, 19C, 21A, 21B, 21C, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5	P3	31A, 31B, 31C
D–GND		32A, 32B, 32C

Table 1B–10. Power Distribution: A18/A15, A19, A20

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		9A, 12A, 15A, 18A, 24A, 27A, 29A, 29C, 30C, 32A, 32B, 32C
ANALOG GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 6A, 6B, 6C
+15		4A, 4B, 4C
–15		5A, 5B, 5C
–15		5A, 5B, 5C
+6		7A, 7B, 7C
–6		8A, 8B, 8C

Voltage	Jack	Pins
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 4A, 19C, 21A, 21B, 21C, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5	P3	31A, 31B, 31C
D–GND		32A, 32B, 32C

Table 1B–11. Power Distribution: A21

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		9A, 12A, 15A, 18A, 24A, 27A, 29A, 29C, 30C, 32A, 32B, 32C
ANALOG GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 6A, 6B, 6C
+15		4A, 4B, 4C
–15		5A, 5B, 5C
+6		7A, 7B, 7C
–6		8A, 8B, 8C

Voltage	Jack	Pins
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 3A, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19C, 20B, 21A, 21B, 21C, 22B, 23A, 24B, 26B, 27A, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5.2 SENSE		22A
–5.2 SENSE		24C
+5	P3	31A, 31B, 31C
D–GND		1A, 2B, 3A, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30B, 32A, 32B, 32C

Table 1B–12. Power Distribution: A22

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30C, 32A, 32B, 32C
ANALOG GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 6A, 6B, 6C, 9A, 9B, 9C, 14A, 14B, 14C,
+15		4A, 4B, 4C
–15		5A, 5B, 5C
+6		7A, 7B, 7C
–6		8A, 8B, 8C
+HV1		10A, 10B, 10C
–HV1		11A, 11B, 11C
+HV2		12A, 12B, 12C
–HV2		13A, 13B, 13C

Voltage	Jack	Pins
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 3A, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 19B, 20B, 21A, 21B, 21C, 22B, 23A, 24B, 26B, 27A, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5 SENSE		22C
–5 SENSE		24C
+5	P3	31A, 31B, 31C
D–GND		1A, 1B, 1C, 2B, 2C, 3A, 3B, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30B, 32A, 32B, 32C

Table 1B–13. Power Distribution: A23

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30C, 32A, 32B, 32C
ANALOG GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 6A, 6B, 6C, 9A, 9B, 9C, 14A, 14B, 14C,
+15		4A, 4B, 4C
–15		5A, 5B, 5C
+6		7A, 7B, 7C
–6		8A, 8B, 8C
+HV1		10A, 10B, 10C
–HV1		11A, 11B, 11C
+HV2		12A, 12B, 12C
–HV2		13A, 13B, 13C

Voltage	Jack	Pins
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 3A, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 19C, 21A, 21B, 21C, 22B, 23A, 24B, 26B, 27A, 28A, 28B, 28C, 30A, 30B, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5 SENSE		22C
–5 SENSE		24C
+5	P3	31A, 31B, 31C
D–GND		1A,1C, 2B, 2C, 3A, 3B, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30B, 32A, 32B, 32C

HDI–1B–24

Table 1B–14. Power Distribution: A24

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30C, 32A, 32B, 32C
ANALOG GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 6A, 6B, 6C, 9A, 9B, 9C, 14A, 14B, 14C,
+15		4A, 4B, 4C
–15		5A, 5B, 5C
+6		7A, 7B, 7C
–6		8A, 8B, 8C
+HV1		10A, 10B, 10C
–HV1		11A, 11B, 11C
+HV2		12A, 12B, 12C
–HV2		13A, 13B, 13C

Voltage	Jack	Pins
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 3A, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 19B, 20B, 21A, 21B, 21C, 22B, 23A, 24B, 26B, 27A, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5 SENSE		22C
–5 SENSE		24C
+5	P3	31A, 31B, 31C
D–GND		1A, 1B, 2B, 2C, 3A, 3B, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30B, 32A, 32B, 32C

Table 1B–15. Power Distribution: A25

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30C, 32A, 32B, 32C
ANALOG GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 6A, 6B, 6C, 9A, 9B, 9C, 14A, 14B, 14C,
+15		4A, 4B, 4C
–15		5A, 5B, 5C
+6		7A, 7B, 7C
–6		8A, 8B, 8C
+HV1		10A, 10B, 10C
–HV1		11A, 11B, 11C
+HV2		12A, 12B, 12C
–HV2		13A, 13B, 13C

Voltage	Jack	Pins
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 3A, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 19B, 20B, 21A, 21B, 21C, 22B, 23A, 24B, 26B, 27A, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5 SENSE		22C
–5 SENSE		24C
+5	P3	31A, 31B, 31C
D–GND		1A, 2B, 2C, 3A, 3B, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30B, 32A, 32B, 32C

Table 1B–16. Power Distribution: A26

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30C, 32A, 32B, 32C
ANALOG GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 6A, 6B, 6C, 9A, 9B, 9C, 14A, 14B, 14C,
+15		4A, 4B, 4C
–15		5A, 5B, 5C
+6		7A, 7B, 7C
–6		8A, 8B, 8C
+HV1		10A, 10B, 10C
–HV1		11A, 11B, 11C
+HV2		12A, 12B, 12C
–HV2		13A, 13B, 13C

Voltage	Jack	Pins
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 3A, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 19B, 20B, 21A, 21B, 21C, 22B, 23A, 24B, 26B, 27A, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5 SENSE		22C
–5 SENSE		24C
+5	P3	31A, 31B, 31C
D–GND		1A, 1B, 1C, 2B, 3A, 3B, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30B, 32A, 32B, 32C

HDI–1B–30

Table 1B–17. Power Distribution: A27

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30C, 32A, 32B, 32C
ANALOG GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 6A, 6B, 6C, 9A, 9B, 9C, 14A, 14B, 14C,
+15		4A, 4B, 4C
–15		5A, 5B, 5C
+6		7A, 7B, 7C
–6		8A, 8B, 8C
+HV1		10A, 10B, 10C
–HV1		11A, 11B, 11C
+HV2		12A, 12B, 12C
–HV2		13A, 13B, 13C

Voltage	Jack	Pins
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 3A, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 19B, 20B, 21A, 21B, 21C, 22B, 23A, 24B, 26B, 27A, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5 SENSE		22C
–5 SENSE		24C
+5	P3	31A, 31B, 31C
D–GND		1A, 1C, 2B, 3A, 3B, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30B, 32A, 32B, 32C

HDI–1B–32

Table 1B–18. Power Distribution: A28

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30C, 32A, 32B, 32C
ANALOG GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 6A, 6B, 6C, 9A, 9B, 9C, 14A, 14B, 14C,
+15		4A, 4B, 4C
–15		5A, 5B, 5C
+6		7A, 7B, 7C
–6		8A, 8B, 8C
+HV1		10A, 10B, 10C
–HV1		11A, 11B, 11C
+HV2		12A, 12B, 12C
–HV2		13A, 13B, 13C

Voltage	Jack	Pins
+12e	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 3A, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 19B, 20B, 21A, 21B, 21C, 22B, 23A, 24B, 26B, 27A, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5 SENSE		22C
–5 SENSE		24C
+5	P3	31A, 31B, 31C
D–GND		1A, 1B, 2B, 3A, 3B, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30B, 32A, 32B, 32C

HDI–1B–34

Table 1B–19.   Power Distribution: A29

Voltage	Jack	Pins
+5	P1	31A, 31B, 31C
–5.2		30A, 30B
D–GND		15A, 16B, 17A, 18B, 19A, 20B, 21A, 22B, 23A, 24B, 25A, 26B, 27A, 28B, 29A, 30C, 32A, 32B, 32C
ANALOG GND		1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C, 6A, 6B, 6C, 9A, 9B, 9C, 14A, 14B, 14C,
+15		4A, 4B, 4C
–15		5A, 5B, 5C
+6		7A, 7B, 7C
–6		8A, 8B, 8C
+HV1		10A, 10B, 10C
–HV1		11A, 11B, 11C
+HV2		12A, 12B, 12C
–HV2		13A, 13B, 13C

Voltage	Jack	Pins
+12	P2	1A, 1B
–12		2A, 2B
D–GND		1C, 2C, 3A, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 19B, 20B, 21A, 21B, 21C, 22B, 23A, 24B, 26B, 27A, 28A, 28B, 28C, 32A, 32B, 32C
+5		31A, 31B, 31C
–5.2		25A, 29B
+5 SENSE		22C
–5 SENSE		24C
+5	P3	31A, 31B, 31C
D–GND		1A, 2B, 3A, 3B, 4B, 5A, 6B, 7A, 8B, 9A, 10B, 11A, 12B, 13A, 14B, 15A, 16B, 17A, 18B, 19A, 20A, 20B, 21A, 21B, 21C, 22A, 22B, 22C, 23A, 23B, 23C, 24A, 24B, 24C, 25A, 25B, 25C, 26A, 26B, 26C, 27A, 27B, 27C, 28A, 28B, 28C, 29A, 29B, 29C, 30B, 30C, 32A, 32B, 32C

1C Cabling

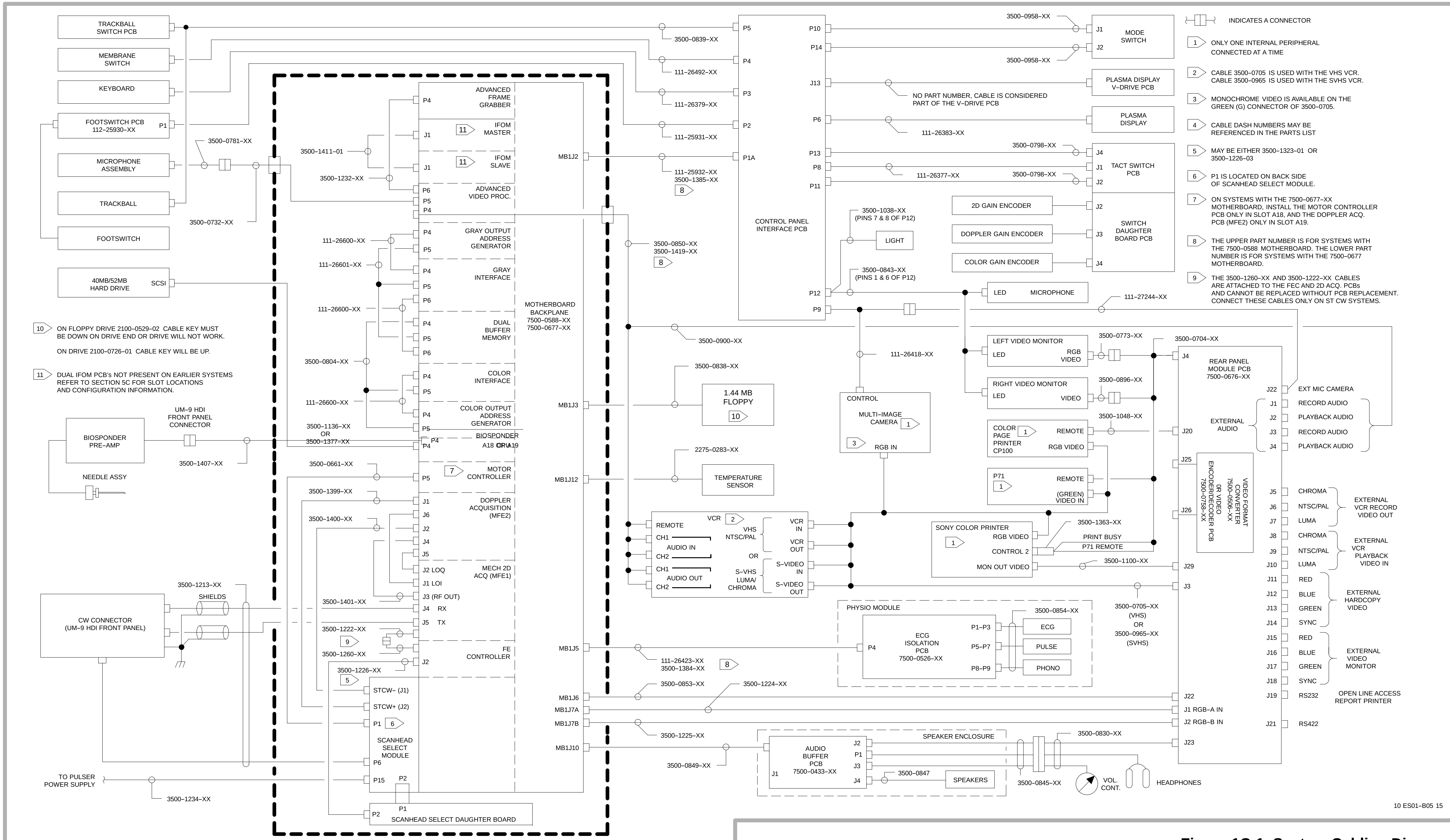


Figure 1C-1. System Cabling Diagram

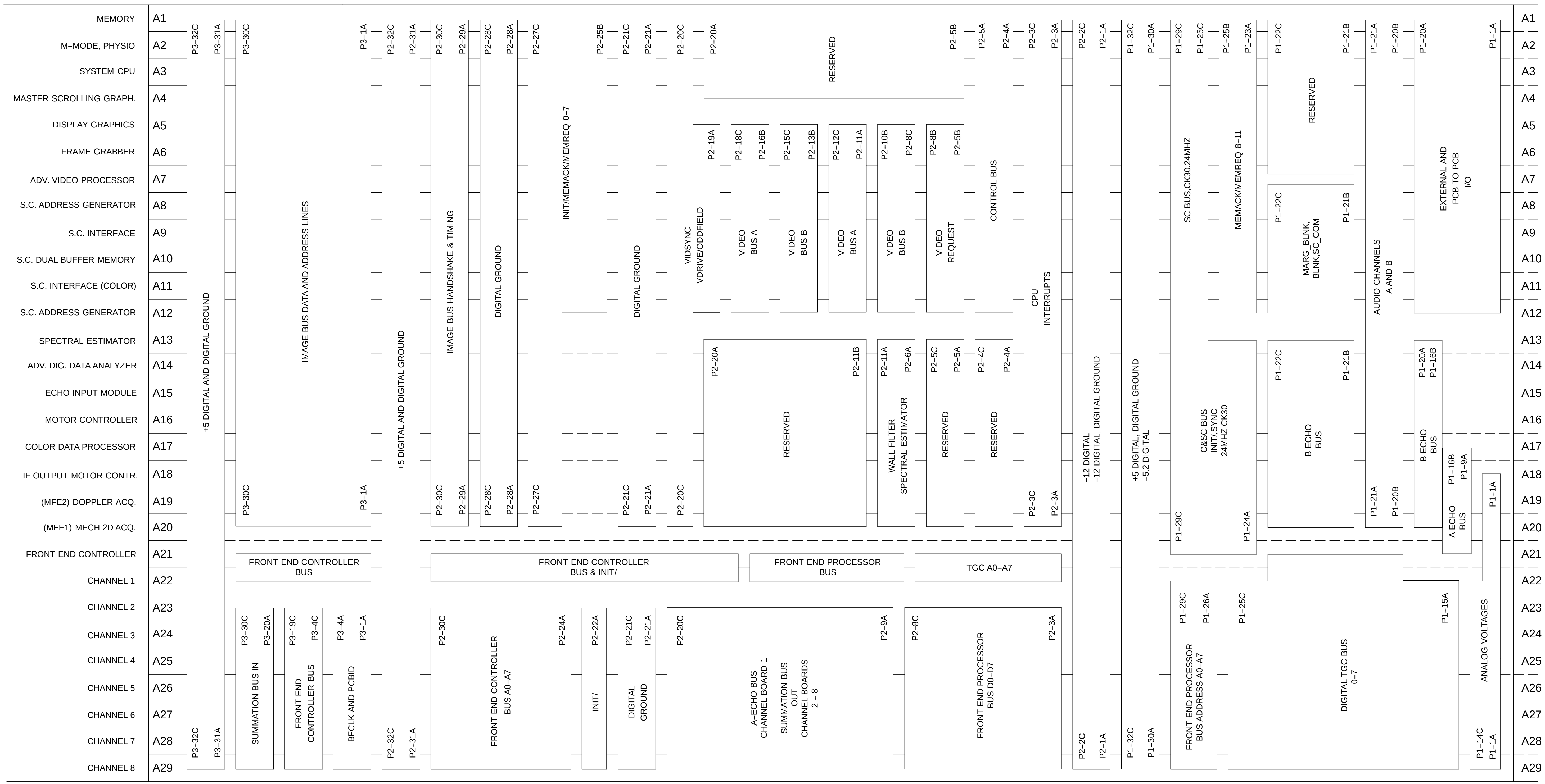


Figure 1C–2. Motherboard Bus Routing (P/N 7500–0588)

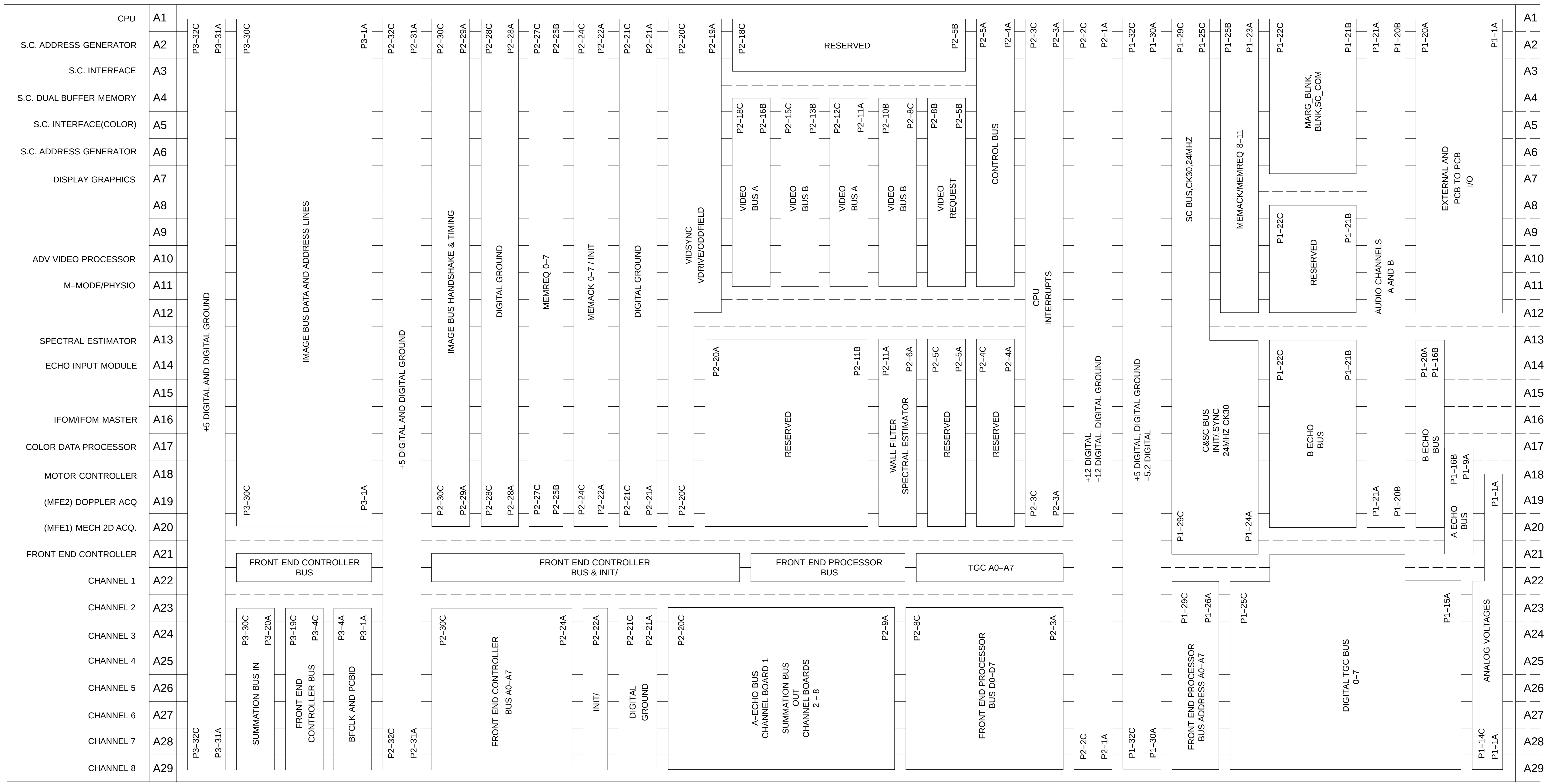


Figure 1C–3. Motherboard Bus Routing (P/N 7500–0677)

Table 1C–1. Rear Panel Connector Matrix

Label	Ext. Dev.	Signal Function	UM-9 HDI Conn. Type	Ext. Dev. Conn. Desc.	Ext. Dev. Conn. Type	Avail-ability	Notes
J1	VCR	Left Chnl Record Audio	Phono	Audio in CH1 (left)	Phono	Option	
J2	VCR	Left Chnl Playback Audio	Phono	Audio out CH1 (left)	Phono	Option	
J3	VCR	Right Chnl Record Audio	Phono	Audio in CH2 (right)	Phono	Option	
J4	VCR	Right Chnl Playback Audio	Phono	Audio out CH2 (right)	Phono	Option	
J5	S/VHS VCR	Record Chroma	BNC	S-Video-in	4-Pin DIN	Option	

Label	Ext. Dev.	Signal Function	UM-9 HDI Conn. Type	Ext. Dev. Conn. Desc.	Ext. Dev. Conn. Type	Avail- ability	Notes
J6	VCR or Compos- ite Vid Monitor (B/W or Color)	Record NTSC or PAL Video	BNC	Video in	BNC or Phono	Stan- dard	Use RG-59 75 ohm BNC to BNC for the external video monitor.
J7	S/VHS VCR	Record Luma	BNC	S-Video-in	4-Pin DIN	Option	Future use
J8	S/VHS VCR	Playback Chroma	BNC	S-Video- out	4-Pin DIN	Option	Connects to Access Acquisi- tion Mod. Use CNTRL-V to select.
J9	VCR	Playback NTSC or PAL Video	BNC	Video out	BNC	Stan- dard	Connects to Access Acquisi- tion Mod. Use CNTRL-X to select.

Label	Ext. Dev.	Signal Function	UM-9 HDI Conn. Type	Ext. Dev. Conn. Desc.	Ext. Dev. Conn. Type	Avail- ability	Notes
J10	S/VHS VCR	Playback Luma	BNC	S-Video- out	4-Pin DIN	Option	Connects to Access Acquisi- tion Mod. Use CNTRL-V to select.
J11	Color hardcopy	Red	BNC	Red-in	BNC	Stan- dard	
J12	Color hardcopy	Blue	BNC	Blue-in	BNC	Stan- dard	
J13	Color hardcopy or B/W hardcopy	Green or Grayscale	BNC	Green-in or Video In	BNC	Stan- dard	Connect J11, J12, J13, and J14 to color printer or connect J13 to B/W external printer.
J14	Color hardcopy	Sync	BNC	Sync-in	BNC	Stan- dard	
J15	RGB video monitor	/red	BNC	Red-in	BNC	Stan- dard	Use RG-59, 75 ohm coax.

Label	Ext. Dev.	Signal Function	UM-9 HDI Conn. Type	Ext. Dev. Conn. Desc.	Ext. Dev. Conn. Type	Avail-ability	Notes
J16	RGB video monitor	Blue	BNC	Blue-in	BNC	Stan-dard	Use RG-59, 75 ohm coax.
J17	RGB video monitor	Green	BNC	Green-in or Video In	BNC	Stan-dard	Use RG-59, 75 ohm coax.
J18	RGB video monitor	Sync	BNC	Sync-in	BNC	Stan-dard	Use RG-59, 75 ohm coax.
J19	Serial Port	Commu-nication	D-sub-miniature 25-pin female	Serial Port	BNC	Stan-dard	Report printer. open-Line trans-fer.

Label	Ext. Dev.	Signal Function	UM-9 HDI Conn. Type	Ext. Dev. Conn. Desc.	Ext. Dev. Conn. Type	Avail-ability	Notes
J21	RS-422 compat-ible com-puter	Commu-nication	D-sub-miniature 37-pin female	RS-422		Not Avail-able	Test port for engi-neering purposes.
J22	Matrix Multi-Image Camera	Control		Computer Interface		Option	

2A Pre-Installation Requirements

2A–1 Introduction

The purpose of this evaluation is to ensure a trouble-free installation and to assist the customer in providing an environment that supports the reliable performance of an ATL ultrasound system. These instructions are intended to guide you through a comprehensive inspection that ensures all physical, electrical and environmental conditions are appropriate for optimum system operation.

NOTE: Some parts of this section include policies, equipment requirements, and procedures that may apply only to U.S. field use. For dealers, affiliates, or other authorized service personnel who do not use the domestic U.S. service documents, use your equivalent document, where applicable.

Two documents have been created for use in the site evaluation program in the U.S.

- A comprehensive Site Evaluation FSR is used to accurately record and document all pertinent customer information as well as the actual site findings. It accommodates evaluating two sites.

- The Customer Information Directory (CID) is a resource document that enables the customer to more easily communicate with ATL. It also serves as a convenient file for keeping FSRs, MA's and other pertinent documentation. The CID should be presented and reviewed with the primary service contact and made accessible to both the equipment user and the CSR.

In addition, system specifications (**Table 2A–1**) are included in this section to assist in evaluating the site.

2A–2 Required Materials

D Tool Kit

D DVM

D Oscilloscope

D ONEAC Line Viewer

D Three-wire Outlet Tester

D Measuring Tape

D ATL General Service manual (4720-0219-01)

D Power Line Data Sticker (4765-0247-01)

D Site Evaluation FSR

2A–3 Initial Customer Contact

In notifying you of a pending new system delivery, the Customer Support Center (CSC) will give you as much lead-time as possible. Although it is our goal to perform an on-site inspection thirty days or more prior to system installation, it is not always possible. For those accounts in which travel is excessive or costly, or in the event that

you are given less than three weeks notice before system delivery, exercise good judgement in determining if you will do a site evaluation prior to installation. In either case, conduct some of the site evaluation over the telephone, completing it at installation. In all cases, the Site Evaluation FSR must be completed.

NOTE: You are required to perform the evaluation prior to installation if given three weeks notice and the customer is within reasonable travelling distance.

To assist you through the proper flow of the pre-installation process, (including how the pre-installation action items will be completed) a flow chart has been incorporated into the Site Evaluation FSR. As you step through the process, circle the action items contained in this flow chart.

When you make your initial call to the customer, include the following steps:

1. Introduce yourself to the customer.
2. Thank the customer for purchasing an ATL ultrasound system.
3. Confirm the system delivery date. Ask your customer if this date is acceptable and if they have any special needs or requirements.
4. Explain the intent of the site evaluation.
5. Schedule an appointment for the site evaluation.
6. Request that a facilities representative (usually an electrician or BMET) be available, if possible.

2A–4 Creating a Positive First Impression

Help your customer get off to a smooth start. Position the site inspection as a value-added service that enhances system performance and reliability. This is an opportune time to begin differentiating yourself from other service vendors.

1. Introduce yourself to the Doctors, the Technologists, the Head of the Department and the BMETs. Present your business card to each of them and thank them for purchasing an ATL ultrasound system.

2. Inquire about current problems they may be having with other equipment in the general vicinity.

3. Also ask about any current or planned construction. This step and the previous one may provide insight into both existing conditions and the potential for future environmental improvements.

4. Circle the applicable steps in the Pre-Installation Flow Chart section of the Site Evaluation FSR.

2A–5 Physical Access for Delivery, Installation, and Operation

Perform the following steps to ensure the delivery and placement of the system go smoothly.

1. Inform the customer about the dimensions of the system, both crated and uncrated.

2. Using these dimensions, evaluate the site for delivery, pay particular attention to the availability of a loading dock, the availability of elevators or ramps and the width of passageways and doors.

3. Verify that adequate space is available for installation.

4. At each operational location, verify the physical space for the system and any external peripherals.

5. Circle the appropriate steps on the Site Evaluation FSR Pre-Installation Flow Chart and note any potential difficulties.

2A–6 Ventilation Requirements

With the test equipment currently in your possession, it is not possible to verify the ventilation capacity of the site. The intent is to advise the appropriate facility representative of system cooling requirements.

1. If the room(s) seem excessively hot or humid to you, ask for the facility engineer to make the appropriate measurements.

2. Circle the appropriate steps on the Site Evaluation FSR Pre-Installation Flow Chart and note any potential difficulties.

2A–7 Electrical Power Requirements

For safety and liability reasons, do not remove the outlet from the wall or gain access to any electrical systems. Have the facility representative describe the wiring and inspect for the criteria specified here.

1. Explain to the facilities representative that the electrical feed to the system should be a dedicated line (no other equipment on the same line) conforming to the specifications outlined in **Table 2A–1**.

2. To verify the presence of a dedicated line, have the facility representative open the circuit breaker and with a DVM or the three-wire test plug, check other outlets and hard-wired devices in the immediate area for a loss of power.

NOTE: Another method of verifying a dedicated line is to have the facility representative measure the current draw of the line at the distribution panel with the system off. There should be no current flow at this time.

3. Verify the proper wiring of the outlet using a three-wire test plug. This plug also tests for the presence of a ground, but it cannot detect neutral/ground reversals.

4. Inform the facility representative of the current draw of the system and its acceptable voltage range. It is the responsibility of the facility representative to determine the proper size of the wire based upon the length of the feed.

5. Using your DVM at the outlet, measure the hot/neutral, hot/ground, and neutral/ground voltages with a comparable load (for example, another ultrasound system) on the line.

6. If a facility representative is not available, skip to step 7. To determine line loss if a facility representative *is* available, perform the following steps:

   a. Have the facility representative measure the voltage at the primary of the line’s circuit breaker in the distribution subpanel.

   b. Measure the voltage at the wall outlet.

   c. Calculate the percentage of voltage loss across the line using the formula:

      [(A – B)/A] x 100

      where A is the voltage at the circuit breaker with the system on and B is the voltage at the wall outlet with the system on.

   d. Continue with step 8.

7. If a facility representative is not available, use the following steps to determine line loss:

   a. Measure the voltage at the outlet with the load on and then with the load off.

   b. Calculate the percentage of voltage loss across the line using the formula

      $[(A - B)/A] \times 100$

      where A is the voltage at the wall outlet with the system off and B is the voltage at the wall outlet with the system on.

8. Using the ONEAC line viewer and oscilloscope, measure the power-line noise following the procedures specified in the General Service manual.

9. Record your observations and measurements relative to power quality on the Site Evaluation FSR.

10. Affix a Power Line Data sticker to the most qualified outlet in each of the primary operating areas.

11. With the assistance of the facility representative, review the supplemental electrical survey questions on the Site Evaluation FSR.

12. Circle the appropriate steps on the Pre-Installation Flow Chart and note any potential difficulties

2A–8 Electrostatic Discharge

The presence of electrostatic discharge (ESD) can cause system lock-ups and reliability problems. Because it is beyond the scope of this procedure to quantify ESD levels, you will need to use your senses to qualify the obvious presence of ESD. You can judge the severity of ESD by observing the following characteristics:

- ESD voltages in excess of 2,000V cause a shock.

- To create an audible discharge, the ESD must reach 5,000V.

D A visible ESD discharge occurs at or above 10,000V.

ESD can result from low humidity, carpeting, linen, and clothing. Avoid placing the system directly under or close to HVAC vents.

1. Check for the presence of ESD by walking around the immediate area where the system will be installed and touching grounded surfaces.

2. Ask the operators about their experiences with static discharge.

3. Suggest possible ESD minimizing devices/techniques such as static mats, humidifiers and sprays.

4. Circle the appropriate step on the Site Evaluation FSR Pre-Installation Flow Chart and note any potential difficulties.

2A–9 Radio Frequency Interference

Radio frequency (RF) interference can be generated from a large variety of electrical devices, and may not present itself as a problem until installation. RF typically causes image noise. If a noise problem occurs at the time of installation, you will need to use the process of elimination to determine the RF source. Familiarizing yourself with these sources now will help you quickly solve RF problems found during installation.

1. Note any obvious or potential RF generators. Typical RF generating devices include (but are not exclusive to) gel warmers, coffee pots, air conditioners, fans, photocopiers, computers, lab equipment, surgical equipment, and refrigerators.

2. Circle the appropriate step on the Site Evaluation FSR Pre-Installation Flow Chart and note any potential difficulties.

2A–10 Dust

Customers who use linen frequently have a dust problem. Because of the air circulation requirements of the system and the location of its air filter, dust can accumulate rapidly and cause the system to overheat.

1. Advise the customer about the need to periodically clean the air filter. A dirty filter can be cleaned with a small portable vacuum cleaner.

2. Circle the appropriate step on the Site Evaluation FSR Pre-Installation Flow Chart and note any potential difficulties.

2A–11 Lighting

Ambient light can interfere with the viewing of video monitors. A darkened room is preferred. Ambient light can be controlled through window shades, light dimmers, and small lamps.

1. Note the presence of shades or blinds, lights, and dimmer controls.

2. Circle the appropriate step on the Site Evaluation FSR Pre-Installation Flow Chart and note potential difficulties and suggestions for improving lighting control.

2A–12 Establishing Customer Expectations

Upon completing the site evaluation, share your findings with the customer and address questions and concerns. The CID contains system specifications if the customer requires documentation.

NOTE: Although your customer needs to be informed of system specifications and possible site issues, be cautious in discussing site problems and corrective actions. If you note customer distress while discussing site problems, end the discussion immediately and advise your regional manager of the situation. Continuing such a conversation could jeopardize the sale of the system.

1. Preview the installation process with the customer, addressing questions your customer may have.

2. Review the CID with the customer. Make your customer aware of ATL Professional Medical Supplies (particularly if they are a first-time ultrasound user) and assist them in ordering consumables.

3. Inquire about needs or concerns your new customer may have. Follow up on specific concerns with the appropriate ATL representative.

4. Circle the appropriate steps on the Site Evaluation FSR Pre-Installation Flow Chart and note any potential difficulties.

2A–13 Completion and Follow-up

1. Review the Site Evaluation FSR to assure total compliance with the pre-installation process.

2. Close out the site evaluation as you would any normal service call.

3. Submit the top copy of the Site Evaluation FSR with your weekly paperwork, and keep the carbon copy.

Table 2A–1. UM-9 HDI System Specifications

System Dimensions (Crated / Uncrated)	
Height	62 / 56 in (157 / 142 cm)
Width	44 / 25 in (112 / 63 cm)
Depth	42 / 37 in (107 / 94 cm)
Weight (lbs)	750 / 565 Lbs (340 / 256 Kg)
Cooling and Ventilation	

Operational Temp	50 to 104° F (10 to 40° C)
Storage Temp	–29 to 149° (–34 to 65° C)
Operational Humidity	15 to 95%
Storage Humidity	5 to 95%
Room Temp Rise	**Air Circulation**
Heat Output	4,200 BTU/Hr (1233 W)
1.8 ° F (1° C)	2464 CFM (70 CMM)
3.6 ° F (2° C)	1232 CFM (35 CMM)
5.4 ° F (3° C)	821 CFM (23 CMM)
7.2 ° F (4° C)	616 CFM (17 CMM)
9.0 ° F (5° C)	493 CFM (14 CMM)
10.8 ° F (6° C)	411 CFM (12 CMM)
12.6 ° F (7° C)	352 CFM (10 CMM)
14.4 ° F (8° C)	308 CFM (9 CMM)

Electrical Power Requirements	
Hot/Neutral (VAC)	100 VAC: 90 – 110 120 VAC: 108 – 132 220 VAC: 198 – 242 240 VAC: 216 – 264
Current Draw (A)	100 VAC: 15 120 VAC: 12.1 220 VAC: 6.7 240 VAC: 6.2
Neutral/Ground (VAC RMS)	< 3
Line Loss (%)	< 3
Distortion (%)	< 20
Common Mode Noise (Vp–p)	< 1.5
Normal Mode Noise (Vp–p)	< 10

Wiring Requirements

The electrical feed to the system shall be a dedicated line (no other equipment on the same line) with a third-wire ground. The ground wire shall be an insulated solid copper conductor bonded to the

ground bus of the service panel. The outlet shall be a Hospital Grade Receptacle (for installations in North America) or an Isolated Ground Receptacle. Proper installation shall reflect compliance with the national electrical code.

2B Installation

2B–1 Introduction

This section contains inspection and installation procedures for the UM-9 HDI (**Figure 2B–1**).

NOTE: Some parts of this section include policies, equipment requirements, and procedures that may apply only to U.S. field use. For dealers, affiliates, or other authorized service personnel who do not use the domestic U.S. service documents, use your equivalent document, where applicable.

Before the UM-9 HDI system is delivered to the site, perform a site inspection as described in Section 2A. After you have completed the inspection and installation of the system, verify correct operation using the performance tests described in Section 2C.

When you arrive at the site, introduce yourself to the staff, present your business card, and verify that you may proceed with the installation of the system.

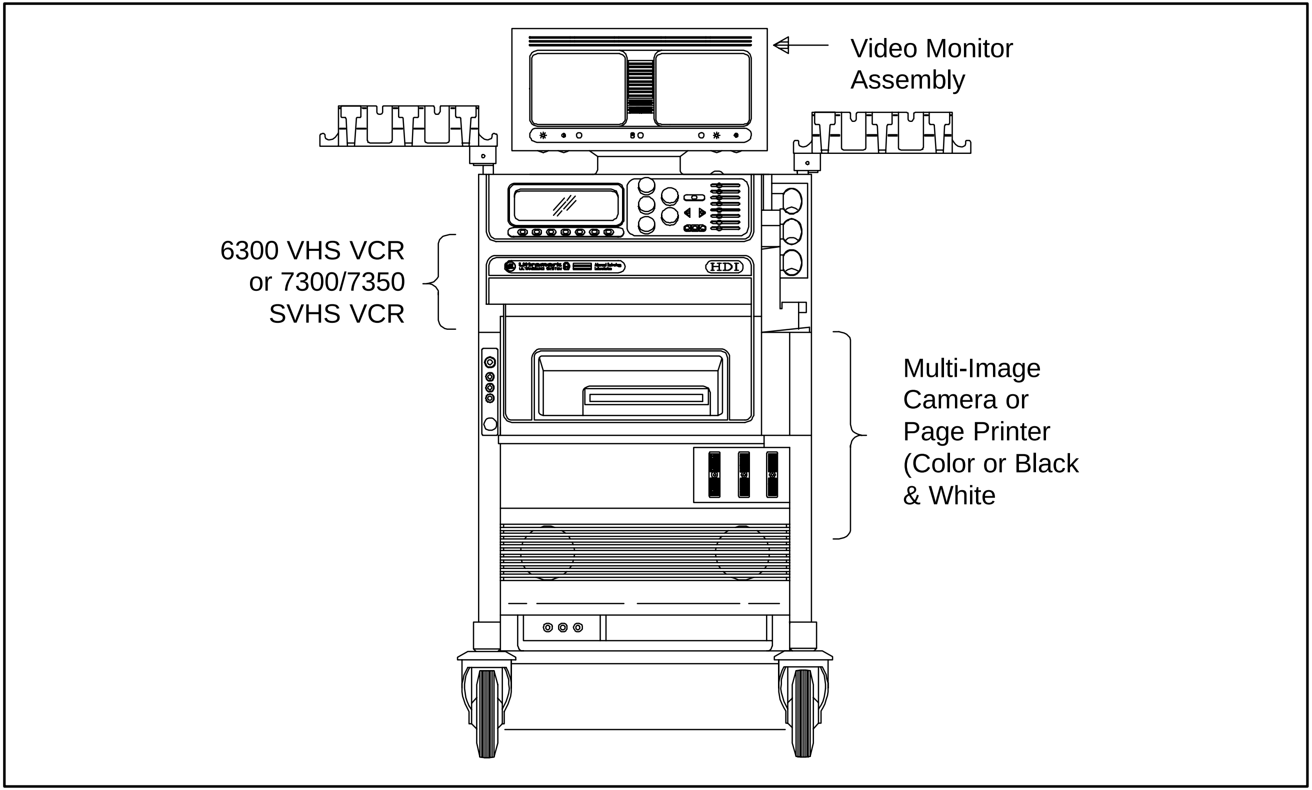


Figure 2B–1. General Configuration (Front View)

2B–2 Materials and Equipment

- 3/16” Allen wrench
- Three-prong outlet test plug
- CSR tool kit
- Oscilloscope
- Oneac line viewer
- Multimeter
- Tissue phantom
- Pre-installation and Installation FSRs
- Customer Information Directory and inserts
- Service manuals for the peripheral devices included in the system

2B–3 Pre-installation Preparation

1. When the system has shipped, advise the customer and provide them with the projected delivery date. If the delivery date is acceptable to the customer, tentatively schedule the installation, allowing time for a late delivery.

NOTE: If you must schedule an installation for the estimated arrival date, ask the ATL traffic department to schedule a guaranteed delivery time. Such a guarantee results in additional cost to ATL, so request it only when necessary.

2. Preview the installation process with your customer and resolve any questions or conflicts. Be sure to discuss the following topics:
   - Time needed to complete the installation
   - Delivery access
   - Set-up facilities
   - Staffing needs
   - Disposal of non-returnable packing materials

3. Ask the customer to notify you through CSC at (800) 433-3246 once the system arrives.
4. Notify the sales representative of your arrangements.

2B–4 Unpacking and Preliminary Inspection

The UM-9 HDI is shipped in either a wooden crate or a corrugated crate. The wooden crate is used for domestic ground shipments and the corrugated crate is used for international and domestic air shipments. After you have unloaded a system from a wooden crate, you will disassemble the wooden crate and send it back to ATL Bothell for re-use. Do not return the corrugated crate for re-use.

Before unpacking, inspect the shipping carton:

1. Examine the shipping crate for damage caused by rough handling. Look for evidence that might indicate that the crate was opened.
2. Verify that the Shockwatch and Tiltwatch indicators on the outside of the carton have not been activated.
3. Report any damage or pilferage to the carrier and to the ATL traffic department.

2B–4.1 Wooden Crate Unpacking Procedure

Use the following procedures for unloading a system shipped in a wooden crate, and for returning the crate to ATL.

Unloading

NOTE: Before attempting to unload the system, ensure that the area in front of the shipping crate ramp is clear for at least nine feet. (The ramp is labeled with the OPEN THIS END sticker.)

1. Remove the bolts from the top of the crate and the bolts on the ramp (**Figure 2B–2**).

2. Lift (but do not remove) the top of the crate from the front side until the ramp is released. Pull the ramp down.

3. Remove all boxes from inside the crate (scanheads, manuals, external peripherals, etc.).

4. Remove the ramp brace.

5. Unlock the casters and roll the system down the ramp.

6. If necessary, use the 3/16” Allen wrench to adjust the casters.

7. Remove the plastic cover and the monitor cushions.

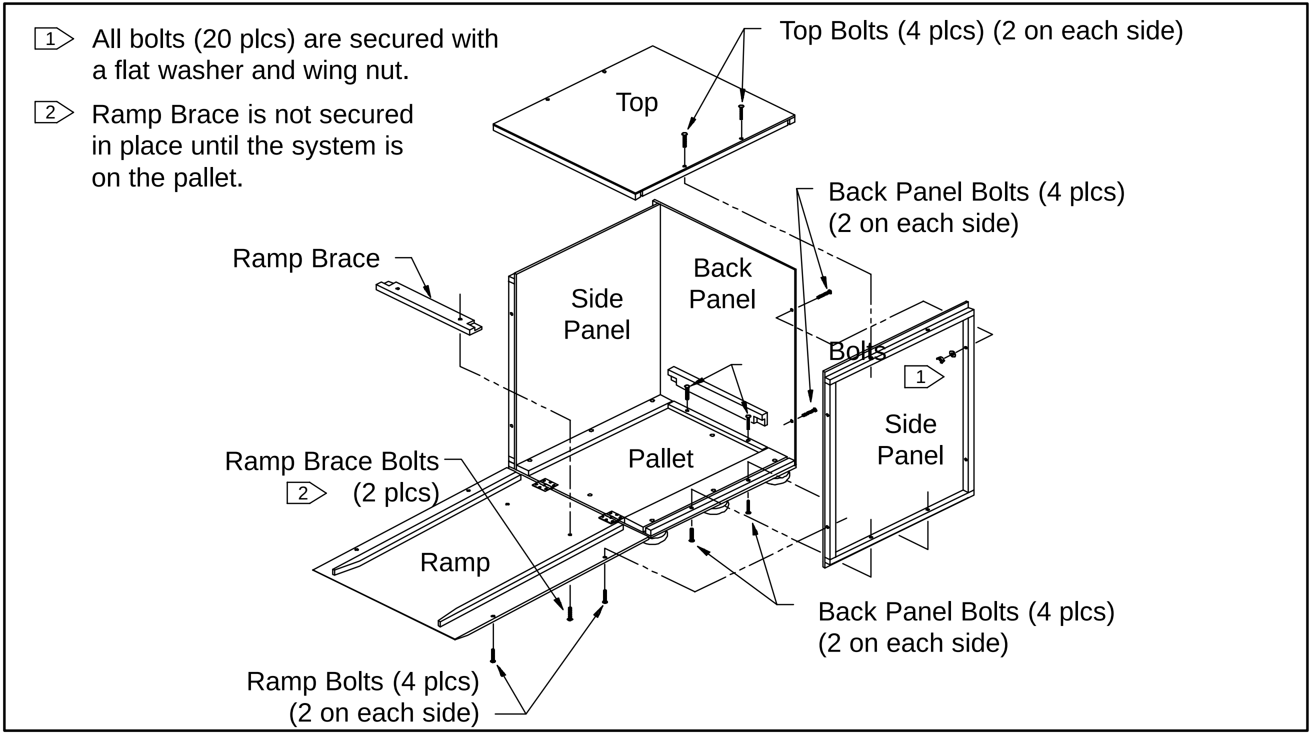


Figure 2B–2. Wooden Crate

2B–4.1.1 Crate Disassembly

1. Remove the top of the crate.

2. Remove all remaining bolts around the outside of the crate.

3. Remove the side panels and the back panel.

4. Slide the ramp sideways to separate from the hinges, and remove the ramp from the pallet.

5. Place the back panel on top of the pallet so that the wood brace faces down and the panel is parallel to the floor (**Figure 2B–3**).

6. Place a side panel on the back panel with the 2x2's up.

7. Place the plastic cover, hardware bag, ramp brace, and monitor cushions onto the side panel. (Place cushions in the center.)

8. Place the other side panel over the stacked crate with the 2x2’s down.

9. Place the ramp on the stacked crate with the guides up.

10. Place the top on the stacked crate with the flat surface up.

11. Band the crate from both sides using the bands provided. Tighten bands securely.

2B–4.1.2 Crate Shipping Preparation

NOTE: Do not tighten wing nuts before all wing nuts are started.

1. Cut the bands from the crate (see **Figure 2B–3**). Remove all panels from the pallet. Remove the hardware bag, monitor cushions, and plastic system cover.

2. Attach the ramp hinges to the pallet hinges with the ramp guides facing up.

3. Install the back panel on the pallet opposite the ramp with the wood brace facing the inside of the crate near the bottom.
4. Loosely bolt the back panel to the pallet, inserting the bolts from under the pallet. Brace the back panel with your knee to prevent the panel from falling over.
5. Remove the top of the crate.
6. Install each side panel with the flat surface to the inside of the crate.
7. The side panels may be used on either side of the crate, however, the flat surface must be to the inside.
8. Loosely bolt the back panel to the side panels. Install each bolt so the stem is to the inside of the crate.
9. Loosely bolt the side panels to the pallet.
10. Install the top of the crate so it fits snugly over the side panels.

11. Tighten the wing nuts to secure the crate for shipment.

12. Fill out the enclosed Bill of Lading and call the carrier phone number on the bill for crate pickup and shipment to ATL Bothell.

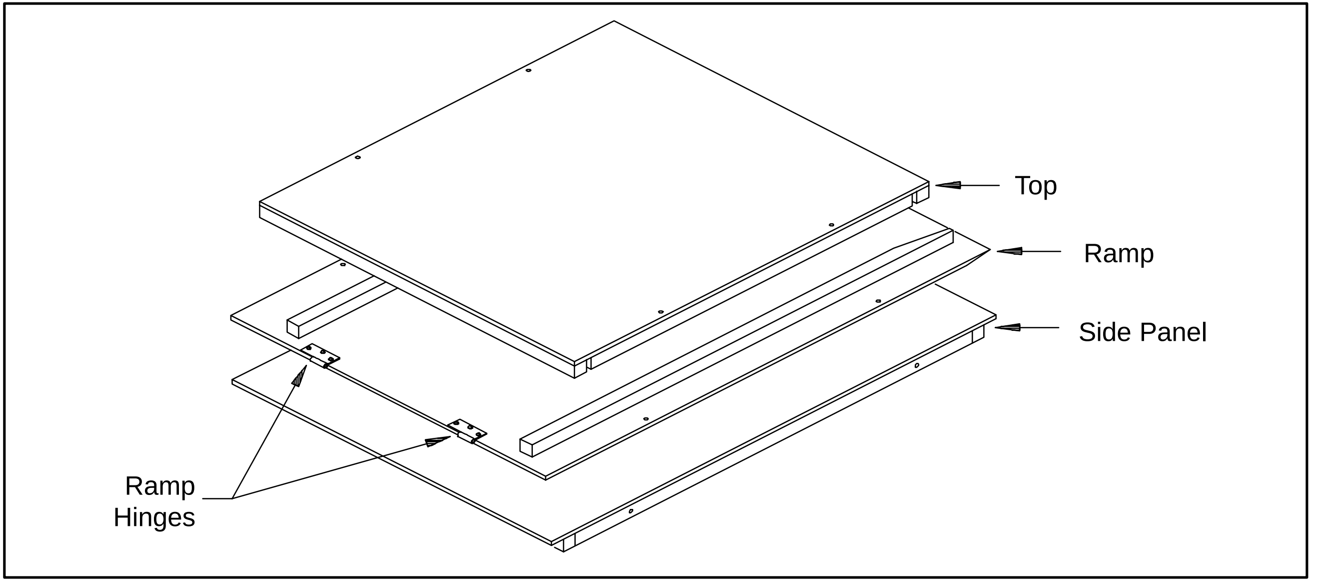


Figure 2B–3. Wooden Crate Shipping Preparation (1 of 2)

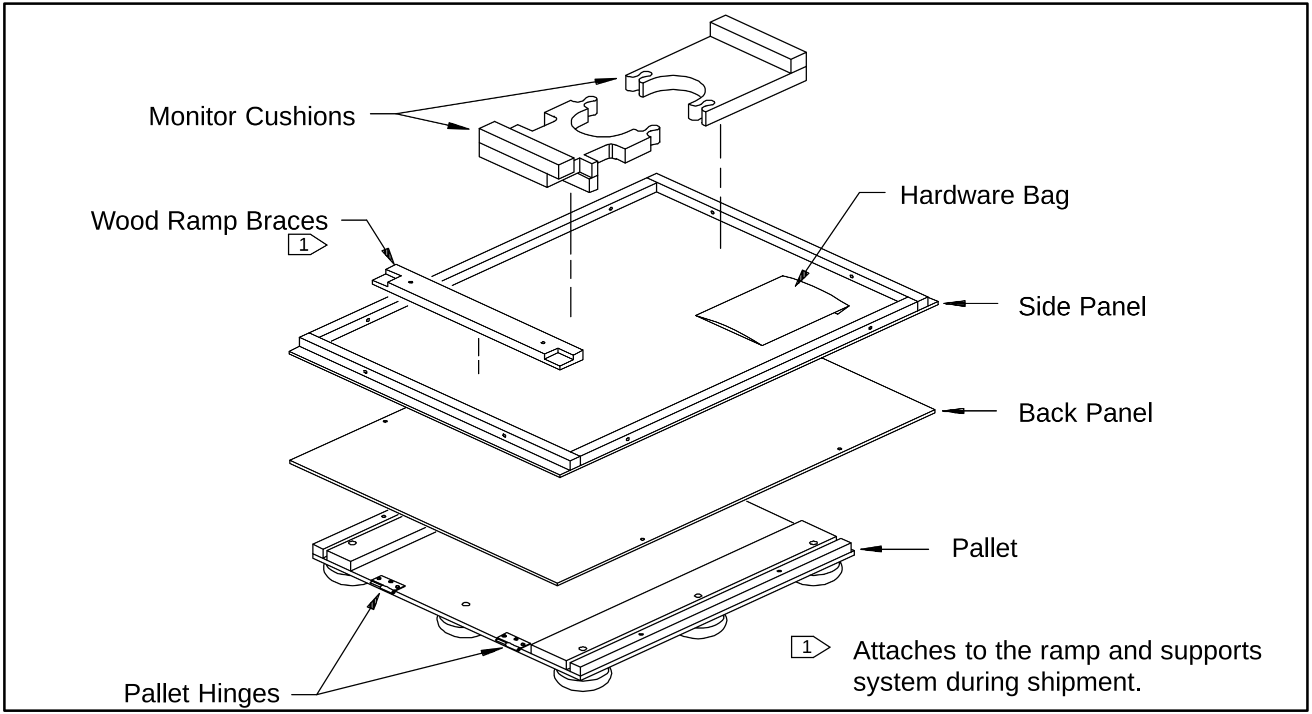


Figure 2B–3. Wooden Crate Shipping Preparation (2 of 2)

2B–4.1.3 Loading

Use the following procedure if you must return a system to ATL.

1. Wrap scanhead holder “arms” and place the monitor cushions under the monitor.

2. Place the plastic cover over the system.

3. Position the system in front of the shipping crate facing the crate. Align the casters with the ramp guides and lock the front casters with the wheels under the system.

4. Push the system onto the pallet and lock one of the rear casters.

5. Turn the other rear caster 180 degrees so it is under the rails. Lock the caster.

6. Unlock the first rear caster and turn it 180 degrees so it is under the rails. Lock the caster.

7. Attach the ramp brace to the ramp (**Figure 2B–2**). The brace secures the system within the crate during shipment.

8. Place all loose items (scanheads, manuals, external peripherals, etc.) in suitable packaging material in the crate.

9. Raise the ramp, and lock the top of the ramp into the top of the crate.

10. Loosely bolt the top of the crate and the ramp to the side panels.

11. Tighten the wing nuts to secure the crate for shipment.

12. Fill out the enclosed Bill of Lading and call the carrier phone number on the bill for crate pickup and shipment to ATL Bothell.

2B–4.2 Corrugated Crate Unpacking Procedure

Use the following procedures for unloading a system shipped in a corrugated crate, and for returning a system to ATL.

Unloading

NOTE: Ensure that the area in front of the shipping crate ramp is clear for at least nine feet before attempting to unload the system. (The ramp is labeled with the OPEN THIS END sticker.)

1. Cut the bands around the crate and cut the tape on top of the cover (**Figure 2B–4**).

2. Remove the clips from the corrugated cover by squeezing and pulling out the inside part of the clip, and then pulling out the whole clip by the tab.

3. Remove the corrugated cover by lifting it out of the slots in the pallet and unfolding it from the pallet.

4. Remove the ramp from the 2x4’s and lower the ramp.

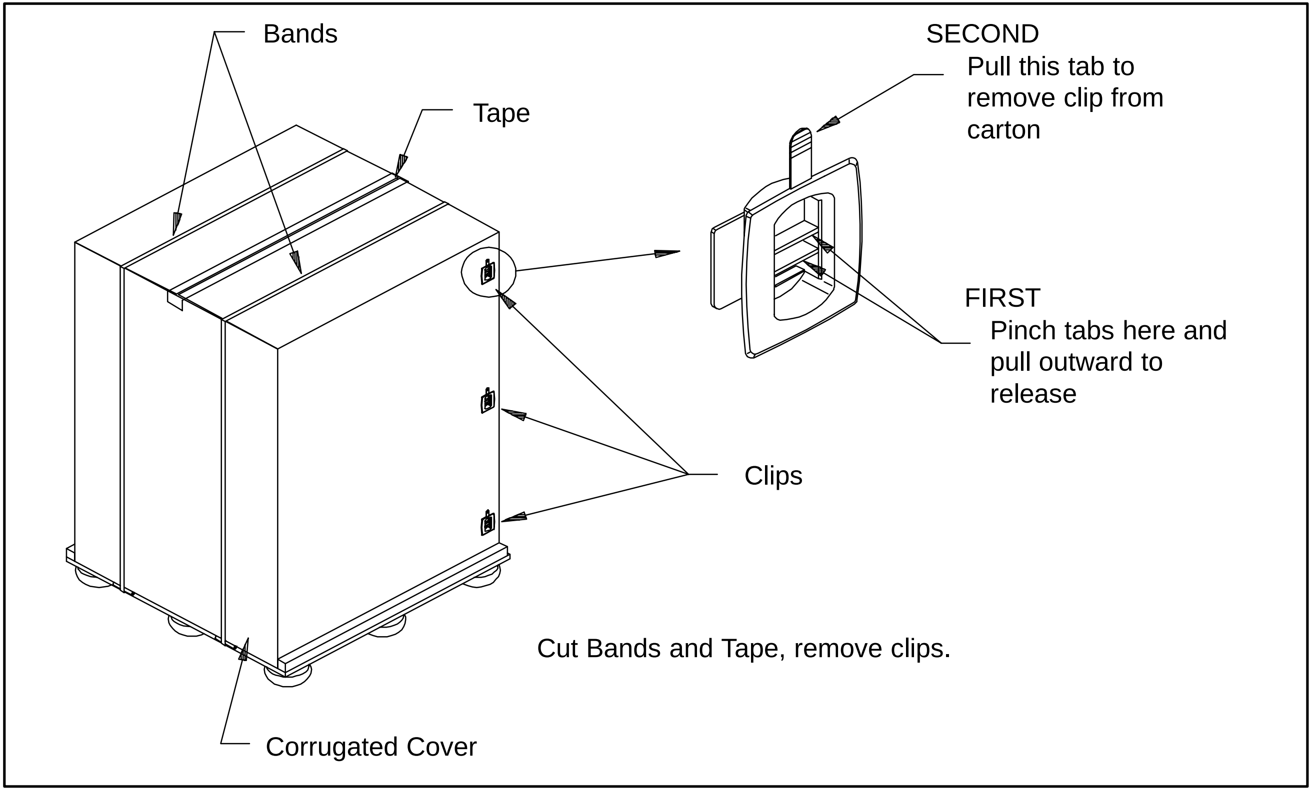


Figure 2B–4. Corrugated Crate (1 of 2)

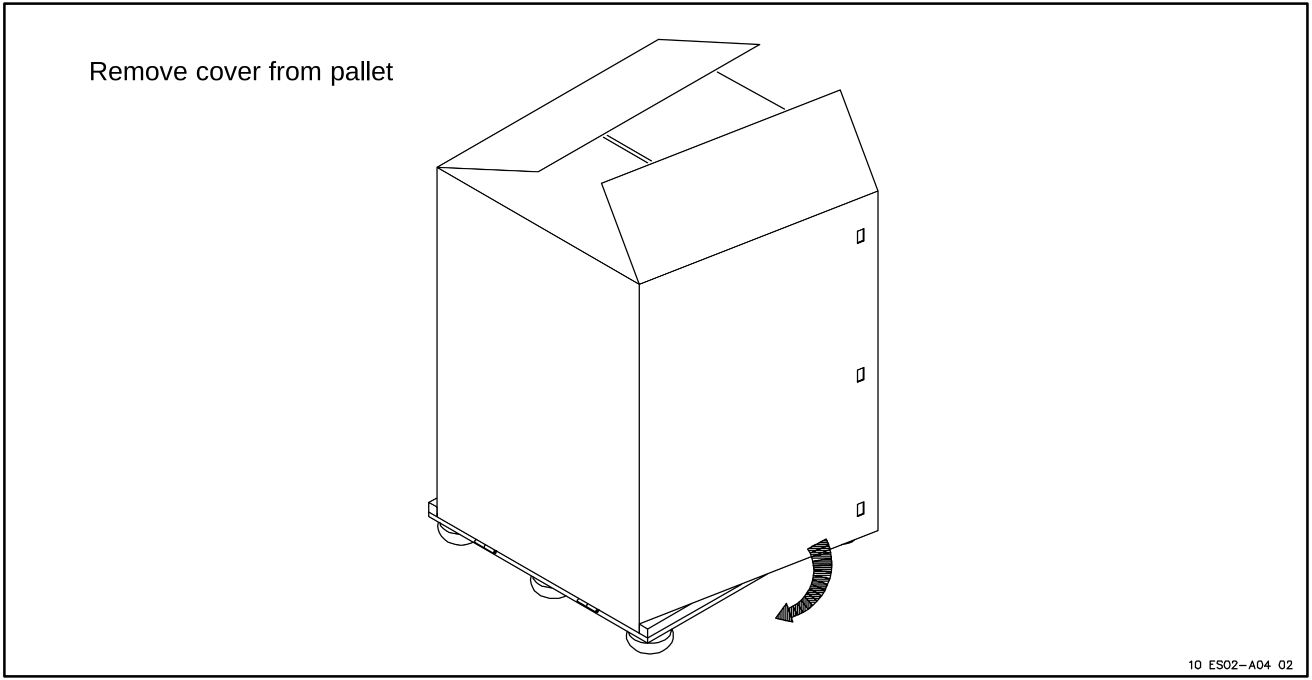


Figure 2B–4. Corrugated Crate (2 of 2)

5. Remove the wood ramp brace.

6. Unlock the casters and roll the system down the ramp.

7. If necessary, use the 3/16” Allen wrench to adjust the casters.

NOTE: Utilize ESD procedures prior to removing the plastic cover.

8. Remove the plastic cover and the monitor cushions.

2B–4.2.1 Loading

Use the following procedure if you must return a system to ATL. If there is no pallet and carton at the site, order them from the ATL Traffic department.

1. Wrap scanhead holder arms and place the monitor cushions under the monitor.

2. Place the plastic cover over the system.

3. Position the system in front of the shipping crate facing it. Align the casters with the ramp guides and lock the front casters with the wheels under the system.

4. Push the system onto the pallet and lock one of the rear casters.

5. Turn the other rear caster 180 degrees so it is under the rails. Lock the caster.

6. Unlock the first rear caster and turn it 180 degrees to the rails. Lock the caster.

7. Attach the ramp brace to the ramp (**Figure 2B-3**). The brace secures the system within the crate during shipment.

8. Place all loose items (scanheads, manuals, external peripherals, etc.) in suitable packing material in the crate.

9. Raise the ramp, and bolt the 2x4's snugly to the exterior of the ramp guides.

10. Wrap corrugated cover around the pallet, fitting the cover into the groove on each side of the pallet.

11. Align the holes on opposing sides of the cover so that the flap is to the inside of the pallet.

12. Install the plastic clips through the holes in the cover.

13. Fold and tape the top down.

14. Band the crate for shipment.

2B–4.3 General Inspection (Figure 2B–5)

WARNING

Dangerous voltages are present inside the UM-9 HDI. Do not connect the UM-9 HDI to the AC line voltage until proper line voltage has been verified, and a thorough inspection of the UM-9 HDI has been performed.

1. Remove the system from the shipping carton as described in previous paragraphs.

2. Inventory the shipment against the packing list.

3. Verify the physical configuration of the system according to the Customer Order Acknowledgment (COA) enclosed with the system. Document any discrepancies or back-orders on the Installation FSR.

4. Inspect the video monitors for damage. Verify the monitor swivels correctly on its base from left to right and up and down

5. Inspect the interactive display for scratches or damage.

6. Inspect the remaining outside surfaces for damage.

7. Verify that the system rolls and turns smoothly on its casters.

8. Remove the six Phillips head screws from the middle, top, and bottom of the rear door cover assembly. Remove rear door cover assembly.

9. Remove the two bolts from the top of the lower front speaker panel.

CAUTION

Take care not to damage the coax cables that connect the PCBs.

10. Tip the edge of the speaker panel away from the system and lift the panel out of the retaining slot. Disconnect the speaker cables and place the panel aside.

11. Remove the two screws from the bottom flange of the rear panel. Drop the rear panel down and set it aside.

12. Gently pull the back edge of the left side panel away from the cart frame to disengage the ball studs from the ball stud receivers.

13. Pull the back edge of the left side panel away from the frame and slide it forward to clear the ECG and audio jacks. Lift the left side panel off and set it aside.

14. Pull the control panel drawer out approximately 10 inches.

15. Repeat steps 13 and 14 to remove the right side panel

16. Remove the two control panel drawer-slide retaining screws.

17. Verify that both the VCR and hardcopy device slide freely and independently in and out of the cart.

18. Verify that the hardcopy device is properly installed and undamaged.
19. Push in on the system keyboard to release its catch. Verify that the keyboard slides in and out freely and latches correctly.
20. Remove any loose packing material, dust, or debris from the interior of the system.

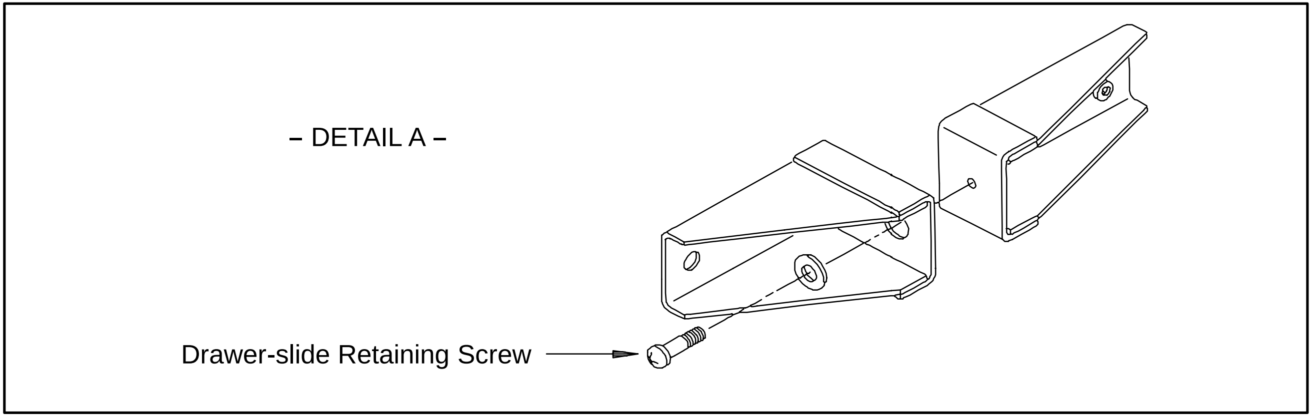


Figure 2B–5. General Inspection (1 of 2)

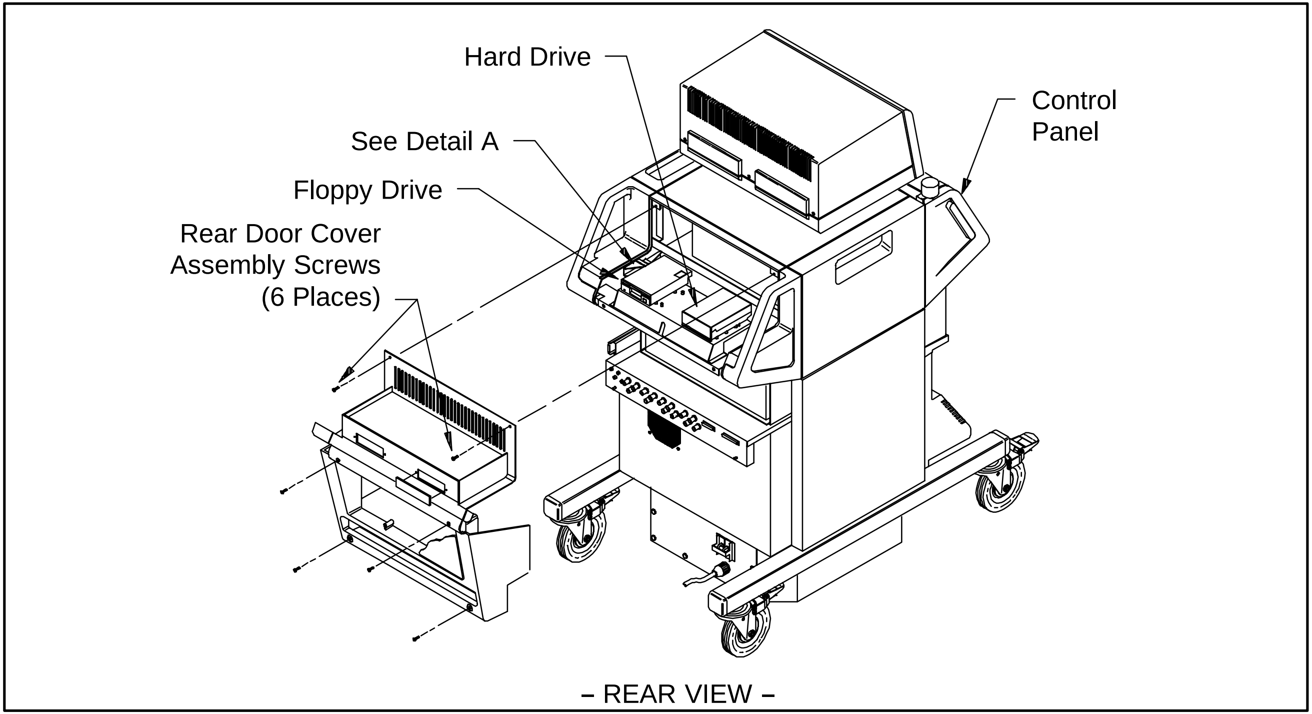


Figure 2B–5. General Inspection (2 of 2)

2B–5 Mechanical Inspection (Figure 2B–6)

1. Perform steps 9 through 15 of paragraph 2B–4.3 to remove the lower front cover and the left and right side panels.

2. Inspect all of the bolts used to secure the cart weldment to the cart legs, the card cage to the cart weldment, and the control panel to the control panel drawer. Tighten fasteners as necessary.

3. Inspect the remaining fasteners and tighten as necessary.

2B–6 Electrical Inspection

The electrical inspection may require reference to the power distribution wiring diagrams (Section 1B), cabling diagrams (Section 1C), or cabling revision levels in the parts list (Section 8). The parts list also contains information on PCB locations and part numbers. The configuration section (Section 5A) contains current information on PCB and PROM replacement revision levels.

Switch settings for the peripherals are contained in the following peripheral field service manuals:

- Black and White Printers (4720-0220-01)
- Color Video Printers (4720-0221-01)
- Camera (4720-0222-01)
- VCRs and Report Printer (4720-0223-01)

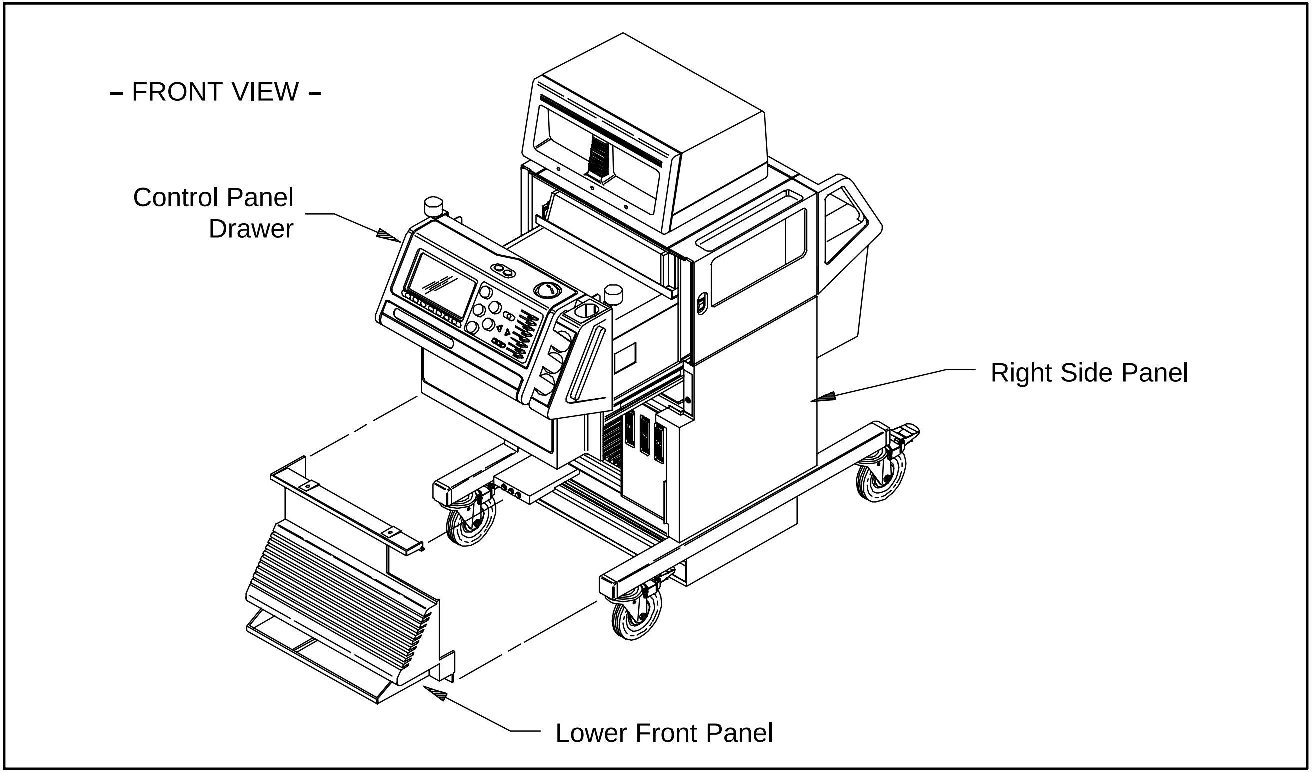


Figure 2B–6. Mechanical Inspection (1 of 2)

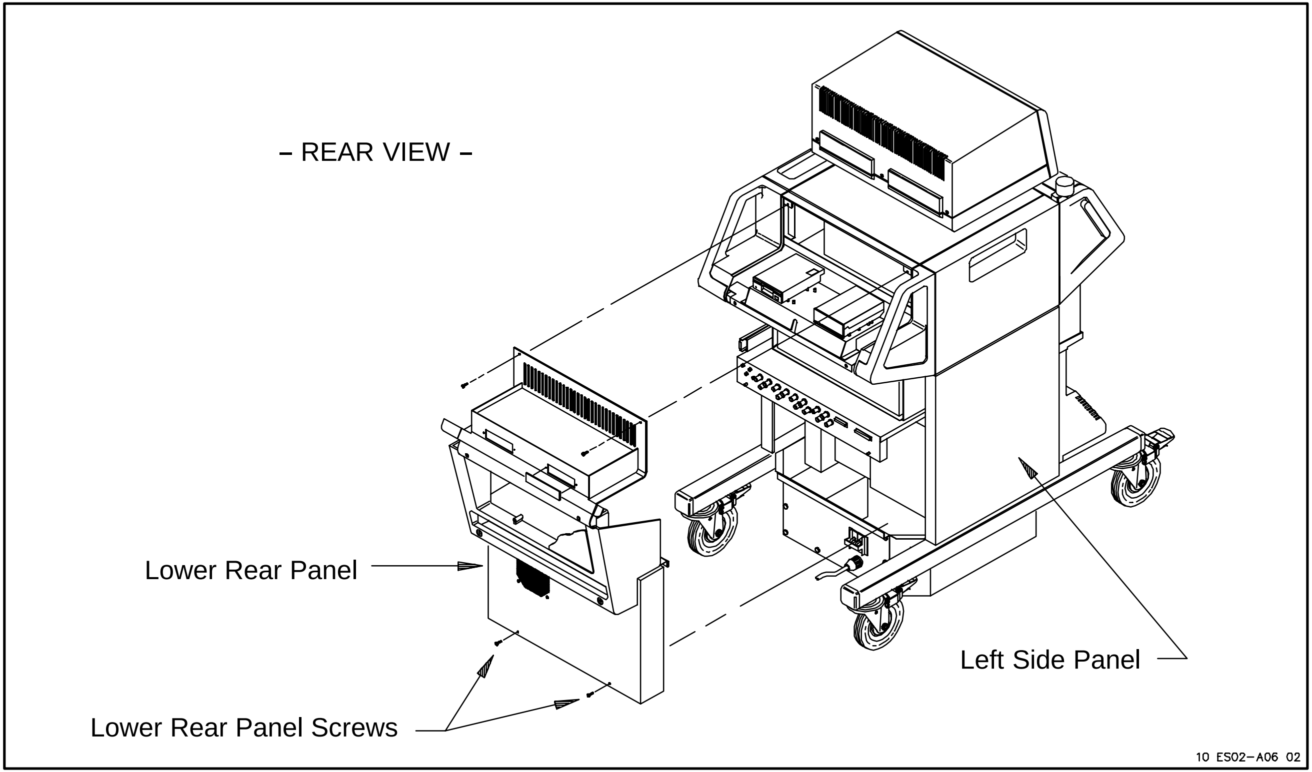


Figure 2B–6. Mechanical Inspection (2 of 2)

2B–6.1 Lower System Electrical Inspection

1. Remove the front cover of the system using the mechanical inspection procedure.

2. Remove the static shield.

3. Verify each PCB is properly seated and in its correct location.

4. Verify that the PCBs necessary to support the system configuration are installed.

5. Verify the flat cable connectors on the front edge of the Scan Converter PCBs (A8 through A12 or A2 through A6) are secure.

6. Verify the Doppler signal cables are connected correctly.

7. Verify the VCR and hardcopy device power cords are plugged into the service receptacle.

8. Verify that all power connections are secure on the lower rear of the system.

2B–6.2 Top System Electrical Inspection

Beginning at the top front of the UM-9 HDI, check the following:

1. Remove the two screws that secure the VCR tray to the peripheral tray. While holding the VCR back, pull the control panel all the way forward.

2. Check all of the accessible ribbon cable connections on the back of the Control Interface PCB for tightness and proper seating.

3. Pull the VCR all the way forward. Move to the right side of the UM-9 HDI.

4. Check the ribbon cable connectors to the disk drives for tightness and proper seating.

5. Verify the connections on the back of the VCR are secure and correct (**Figure 1C–1**).

6. Refer to **Table 2B–1** and verify that the VCR rear panel switches are set correctly.

Table 2B–1. AG7350 VCR Settings

AG-7350 VCR Front Panel (none on rear panel)	
Front Panel	
AUDIO GAIN (4)	3/4 MAXIMUM (or as necessary)
Tracking	Center Detent
Slow Tracking	Center Detent
Picture	Center Detent
Hidden Switch Panel (bottom center, screw on right)	
CH2 Meter select	CH2
Audio Monitor	
CH1/MIX/CH2	MIX

Meter	NORM
Audio Out	NORM
Input	S-VIDEO (If S-Video cable is used)
	LINE (If BNC cable is used)
Sync	INT
TV System	PAL (7350E); INT (7350P)
Sensor rec	OFF
Ext timer	OFF
Mode lock	OFF

On-Screen Program Settings (on Monitor)

Connect VCR to J9 on UM-9. On UM-9 system keyboard, hold down <SHIFT> and <CTRL> and type “IC”, then type “AF010101” for VCR loop-through.
On UM-7 General Menu change Print Mode to Multi.
On the AG-7350 upper right panel, simultaneously press the SCREEN DISPLAY and DOWN Search controls. Then use the DOWN and DATA buttons to set the following items to the listed parameters:

Menu Page 1	
AUDIO LIMITER	ON
DOLBY NR	ON
AUDIO CH2	AUDIO
AUDIO DUB	CH2
TAPE IN MODE	STOP
HIFI REC	ON
S-VHS	ON
EDIT	ON
VIDEO MODE	AUTO
NOTCH (7350E only)	OFF
Press SHIFT to advance to Menu Page 2. Set the following items to the listed parameters:	
Menu Page 2	
TAPE IN MODE	STOP
TAPE END MODE	STOP
AUTO BACKSPACE	ON
DIRECT SEARCH	OFF

<table>
<tr><td>STBY OFF TIME</td><td>5 MIN</td></tr>
<tr><td>WIDE MODE</td><td>NOR</td></tr>
<tr><td colspan="2">To return to normal operation:
On VCR press SCREEN DISPLAY;
On UM-9, hold down <SHIFT> and <CTRL>, type “IC”, then type “AF010100” to exit loop-through.
On UM-7, return Print Mode to Normal.</td></tr>
</table>

2B–6.3 Midsection System Electrical Inspection

The midsection of the system may contain one of the following hard-copy devices:

- Matrix 1010 Multi-Image Camera
- Aspect Multi-Image Camera
- Mitsubishi P71 Black and White Page Printer
- Hitachi VY100 Color Page Printer
- Mitsubishi CP100 E/U Color Page Printer
- Sony Color Page Printer

Use the inspection procedure appropriate to the hardcopy device installed in the system.

Matrix 1010 Multi-Image Camera Electrical Inspection

1. Open the front door of the system.

2. Verify that the camera POWER switch is ON, viewing port is closed and control panel cover is closed.

3. Close the front door of the system.

4. Refer to **Table 2B–2** and verify that the camera rear panel switches are set correctly.

5. Verify that the cable connections on the camera rear panel are correct and secure.

Table 2B–2. Matrix 1010 Camera Settings

Switch/Connector	Setting
INTERLACE SELECT	X2
OFF/OVERRIDE	OFF
VIDEO OUT	75-ohm termination

Mitsubishi P71 Black and White Page Printer Electrical Inspection

1. Open the front door of the system.

2. Load paper into the printer.

3. Refer to **Table 2B–3** and verify that the printer switches are set correctly.

4. Verify that the cable connections on the page printer rear panel are correct and secure.

5. Refer to the B/W Printer Field Service Manual to set the printer switches and controls to the correct positions.

6. Verify that the cable connections on the page printer rear panel are correct and secure.

Table 2B–3. Mitsubishi P71 Settings

Control	Setting
Front Panel	
POWER	ON
CONTRAST	NORMAL
PRINT – POSI/NEGA	POSI
DIRECTION	NOR
INPUT	VIDEO
FRAME/FIELD	FRAME
Rear Panel	
PAPER	SUPER
LINES	525 (NTSC) / 625 (PAL)
IMP	75 OHM (Set to HIGH if input is not terminated at P71.)
VIDEO LEVEL – INPUT LEVEL	3 o'clock position
DIP SWITCHES	All off (down)

Sony UP5000, UP5200, UP5250 Color Page Printer Electrical Inspection

1. Open the front door of the system.

2. Load an ink cartridge and paper pack, if they are not already loaded.

3. Refer to **Table 2B–4** or **Table 2B–5** and verify that the printer switches are set correctly.

4. Verify that the cable connections on the page printer rear panel are correct and secure.

Table 2B–4. Sony UP5000 Settings

Control	Setting
Front Panel	
ALARM LED	OFF
PRINTING LED	Lit (during print cycle)
AGC	ON
Key Pad	
OPR LED	Lit
Rear Panel	
75Ω Switches	ON

Table 2B–5. Sony UP5200 Settings

Control	Setting
Front Panel	
AUTO/MANUAL	MANUAL
GAIN, HUE & COLOR	Centered
Rear Panel	
MONITOR RGB	Centered
RGB — R-Y/Y/B-Y	RGB (Does not affect composite video input.)
75Ω	Normally set to ON. Set to OFF if the signal input drops when another peripheral is connected to VIDEO OUT (looped-through).

2B–7 Reassembly

Use the following procedure to reassemble the system after the mechanical and electrical inspections.

CAUTION

Use extreme care when reassembling the system to avoid pinching, stretching, or otherwise damaging the system signal and power distribution cables.

1. Slide the front edge of the right side panel into place. Pivot the back edge into position. Press in on the panel near the front to seat the ball studs on their sockets.

2. Carefully slide the control panel drawer all the way in and reinstall the two retaining screws.

3. Install the left side panel using the same procedure.

4. Slide the grooved upper edge of the rear panel onto the crossbar on the cart weldment. Push the bottom of the rear panel into place and install the screws in the bottom flange.

5. Set the lower front panel in place. Install the two top screws.

6. Set the rear door cover assembly in place and reinstall the six screws.

2B–8 Setup

1. Dispose of packing materials and clean up the unloading area.

2. Move the system to the installation location.

3. Using a three prong outlet test plug and a multimeter, verify proper outlet wiring and voltage levels.

WARNING

Do not plug the system in if a wiring fault is discovered. Advise the customer immediately and proceed only after the fault has been corrected.

4. Disassemble the power plug and verify that all connections are tight.

5. Connect scanheads, footswitches, peripheral cables, and the power cable.

6. Install cable management hooks according to user preference.

7. Center the Brightness and Contrast controls on the monitors.

8. Turn on power to the system and peripherals and verify proper system initialization, paying close attention to test patterns, messages, and the length of time required.

9. Verify that the system fans are operating.

2B–9 Operational Verification and Configuration

Verify proper system performance using the test procedures in Section 2C.

2B–10 Final Inspection and Documentation

1. If a Pre-Installation Inspection was not performed, complete the required measurements and observations. Record all pertinent information on the Pre-Installation and Installation FSRs.

2. If the Pre-Installation Inspection was completed, verify electrical power quality using the UM-9 HDI and its peripherals as the final load. Also check your observations of ambient temperature, RF and ESD conditions. Record all measurements and observations on the Installation FSR.

3. Install Manual Changes and Operating Notes into the system Reference Manual. Have the Operating Instructions, the Reference Manual, and the User's Guide available for review with the system operator so that questions can be answered during the system presentation.

4. Complete a PM sticker and attach to the left side of the monitor.

5. Tell the facilities representative that the system is installed and ready for any safety tests that they normally conduct.

2B–11 System Presentation

When the UM-9 HDI system and the customer documents are ready, present them to the operators using the following in-service procedure.

1. Introduce the system to the operators and review the COA to familiarize them with the system and its options and to assure that they have received what they ordered.

2. Present the Operating Instructions, Reference Manual, and the User's Guide. Show the major sections of these manuals and emphasize that all information needed to operate the system and peripherals is in them. As questions come up, guide the operators through these manuals.

3. Show the operators how to power-up the system and any external OEMs. Also show them the location of the main circuit breaker.

4. Describe the initialization process and explain that the system programs itself in the process.

5. Once the system is fully initialized, give the operators a brief demonstration of system controls. Limit discussion of the touch panel to the concept that it contains higher level commands for the functions selected by the mode buttons. Review the following:
   - Dual monitor concept and the Brightness/Contrast controls
   - Mode buttons – 2D, M, DOP, COLOR, XDCR, SETUP, and CALC
   - Touch panel
   - Rotary controls – 2D/M GAIN, DOPPLER GAIN, COLOR GAIN, DEPTH, and OUTPUT
   - Other buttons – FRZ, PRINT L and R, VCR RECORD L, R, and ATV

- D TGC slide controls
- D Trackball, SET and ENTER buttons, and the trackball assignment annotation
- D Volume control
- D Transducer ports including scanheads, ECG, and pulse/ phono

6. Describe the hardcopy devices provided with the system and have the operator reload the applicable consumables.

7. Demonstrate the XDCR button and the Transducer Select panel.

8. Demonstrate the PATNT DATA button, the Patient Data Entry form, and how the Exam Type selection affects setups, calculations, and annotation functions.

9. Demonstrate the primary 2D controls:

   D Control Panel controls – 2D, DEPTH, # FOCAL ZONES, 2D GAIN, OUTPUT, the TGC slide controls, and FRZ

   D On-screen trackball assignment annotation

   D Cineloop Image Review

10. Demonstrate the annotation features:

   D Cursor positioning using the trackball and the HOME function (<CTRL>-A)

   D Application-specific annotation menus

   D Annotations typed on the keyboard (avoiding the application-specific function)

11. Demonstrate the primary 2D measurement controls:

   D The SET and ENTER buttons and the assignment annotation in conjunction with the trackball

   D Linear measurements

   D Circumference measurements

12. Demonstrate the VCR and hardcopy devices:
    - Control panel controls – SETUP button, PRINT L and R, VCR RECORD L, R, and ATV
    - HARDCOPY DEVICES selection
    - External device touch panels
    - VCR touch panels

13. Demonstrate the primary M-Mode controls:
    - Control Panel controls – M, DEPTH, 2D/M GAIN, OUTPUT, TGC slide controls, FRZ
    - M-Line position

14. Demonstrate the primary Doppler controls:
    - Control Panel controls – DOP, DEPTH, DOPPLER GAIN, OUTPUT, FRZ
    - Sample volume positioning
    - Velocity range
    - Doppler data review

15. Demonstrate the primary Color Doppler controls:
    - Control Panel controls – COLOR, DEPTH, COLOR GAIN, OUTPUT, FRZ
    - Color overlay size and position
    - Velocity range
    - Cineloop image review

16. Describe and demonstrate system maintenance procedures to be performed as needed:
    - Fan filter cleaning
    - System cleaning
    - Scanhead disinfection
    - B/W printer head cleaning

2B–12 Customer Acceptance

1. Discuss the present status of the system with your customer and review I/Q hardcopies. Be sure to cover any environmental concerns as well, making suggestions as appropriate.

2. Present your customer with the CID and review each section. If this was done at the Pre-Installation Inspection, review it again. Topics to be covered include:

   D The system SO number

   D System warranty

   D ATL support phone numbers

   D Service call process (set expectations for response times)

   D Scanhead replacement process

   D Supplies and consumables

   D Continuing education

   D Extended warranty programs (look for and act on buying signals)

3. Ask your customer if there are any other issues or concerns that they have with the new system or with ATL. Document them on the Installation FSR and make a commitment to follow-up on those issues.

2B–13 Installation Closure

1. Complete the Installation FSR. If the installation is complete, the call can be closed with CSC. If problems were encountered, document them on the Installation FSR along with any parts used, and labor and travel times. If the installation is not complete, hold the Installation FSR open and complete it at its conclusion.

2. Have your customer sign the Installation FSR and insert it into the CID.

3. Call CSC and advise them of the status of the installation. Be prepared to provide them with the following information:

   - Verification of the SO number

- Verification of customer name, address, contact, and phone number
- Information relevant to the quality of the system and its installation
- Any other information that you feel is pertinent to the new customer

4. Notify Sales on the status of the installation. If there are issues that will affect the Applications training, advise the Applications Representative or the Regional Clinical Specialist.

5. Include a reminder in your Day Planner to make a follow-up phone call to your customer one week after installation to assure satisfaction with the new system.

6. Retain a copy of system records and create a file for your new account.

7. Submit the Installation FSR and the Pre-Installation FSR (if done at the time of Installation) using normal procedures.

2B–14 Customer Follow-up

1. Act on the reminder in your Day Planner—call your customer and verify satisfaction with the system.

2. Verify that applications training has been scheduled and take ownership of any concerns that the customer presents to you.

3. Make a reminder in your Day Planner to make a follow-up call to your customer once those issues have been resolved and report them to CSC as applicable.

2C Performance Tests

2C–1 Test Equipment and Materials

- CSR Tool Kit (193-90003-01)
- RMI Model 413 Tissue Equivalent Phantom (199-12204-00)
- UM-9 Monitor Overlay (4100-0890-01)

2C–2 Initial Setup Procedure

The initial setup procedure consists of turning on power, observing the initialization routine, verifying system configuration from the PRODUCTION SERVICE TEST PANEL and the customer order acknowledgement (COA), testing the user interface with the control panel test, and adjusting the monitors for optimal viewing.

2C–3 Introduction

This section contains the performance tests that must be performed during the installation of the Ultramark 9 HDI. These tests must also be performed, as required, when the system is serviced, upgraded, or modified. The checklist included at the end of this section can be used to ensure that all tests are performed.

When replacing system PCBs, refer to **Table 2C–1** to find the appropriate test procedures with which to verify correct operation.

Table 2C–1. Performance Test Matrix

When replacing this PCB/ Component:	Perform these test procedures:
2D Acquisition	2C–5.1, 2C–5.4, 2C–9.1
Advanced Digital Data Analyzer	2C–9.1
Advanced Frame Grabber	See Frame Grabber and Scrolling Graphics (B/W and Color)
Advanced Video Processor	2C–5.1, 2C–5.3, 2C–5.4, 2C–11.1, 2C–13.3, 2C–15.1
Audio Buffer	Perform system functionality tests appropriate to PCB replacement
B/W Scrolling Graphics (Master)	2C–5.4, 2C–9.1, 2C–10.1, 2C–10.2
Channel	2C–5.1
Color Data Processor	2C–12.1
Color Scrolling Graphics (Slave)	2C–5.4, 2C–12.2
Control Interface – Control Panel Assy	Perform system functionality tests appropriate to PCB replacement

When replacing this PCB/ Component:	Perform these test procedures:
CPU	2C–5.1, 2C–5.4, 2C–9.1
Doppler Acquisition	2C–5.4, 2C–11.1
ECG Isolation	2C–10.1
Echo Input Module	2C–5.1, 2C–5.4, 2C–5.6, 2C–9.1, 2C–14
Frame Grabber	2C–5.4, 2C–5.8, 2C–13.3, 2C–15.1
Front End Controller	2C–5.1, 2C–5.4, 2C–9.1, 2C–14
IF Output	2C–5.1, 2C–5.4, 2C–9.1, 2C–12.1, 2C–14
Image Bus Memory	2C–5.1, 2C–5.6, 2C–5.7, 2C–9.1, 2C–10.2, 2C–13.3, 2C–15.1
MFE1	2C–5.4
MFE2	2C–5.4
M-Mode/Physio	2C–9.1
Motor Controller	2C–5.1, 2C–14
Rear Panel	Perform system functionality tests appropriate to PCB replacement

When replacing this PCB/ Component:	Perform these test procedures:
Scanhead Select MUX	Perform system functionality tests appropriate to PCB replacement
Scan Conv. Address Generator	2C–5.1, 2C–5.4, 2C–5.6, 2C–5.8, 2C–7.3, 2C–9.1, 2C–11.1
Scan Conv. Dual Buffer Memory	2C–5.1, 2C–5.4, 2C–5.6, 2C–5.8, 2C–9.1, 2C–11.1
Scan Conv. Interface	2C–5.1, 2C–5.4, 2C–5.6, 2C–5.8, 2C–9.1, 2C–11.1
Scrolling Graphics Display	See B/W and Color Scrolling Graphics
Spectral Estimator	2C–12.1
Monitor	2C–5.4
Scanheads	2C–5.4

2C–3.1 Power Up and Initialization

1. Disassemble the UM-9 HDI for electrical inspection as described in Section 9.

2. Ensure that a scanhead is properly connected to the system.

3. Ensure that the installed hardcopy devices contain paper or film, as required.

4. Connect footswitches, headphones, and ECG/Physio devices, as required and available.

5. Connect the UM-9 HDI power cord to a hospital grade AC outlet.

6. Set the UM-9 HDI circuit breaker to ON (|).

7. Set the POWER switch to ON (|).

8. On optional peripherals, observe and verify the following, as applicable:

   D Camera displays warm-up time count

   D Color Page Printer POWER switch illuminated

   D Black and White Page Printer POWER LED is illuminated

   D VCR meter faces and both LEDs in the tape transport area illuminated

9. Turn on power to all external peripherals and verify power LEDs are illuminated.

10. After completion of the initialization process, verify the following:

    a. The 2D CONTROL panel is displayed on the interactive display.

    b. The scanhead connected to connector A is selected and enabled.

c. A real-time 2D image (sector or linear) is displayed on both monitors. The information on each monitor includes the correct enabled scanhead type and frequency data, a TGC curve, and an SPTAd limit (**Figure 2C–1**).

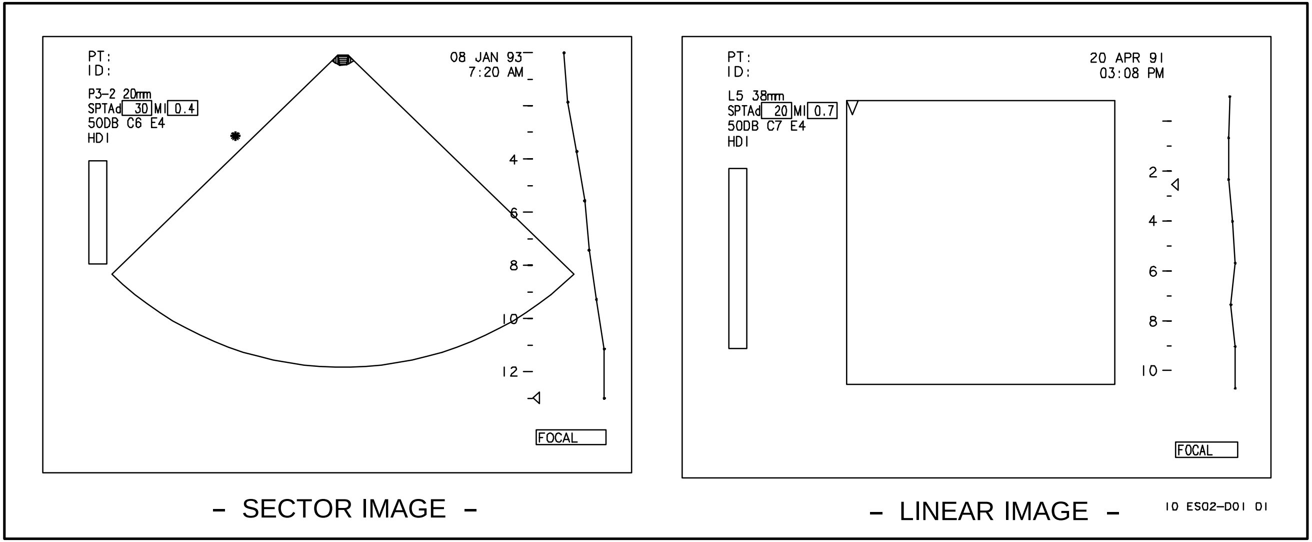


Figure 2C–1. Power-up Displays

11. Throughout the performance tests, verify the following:

    a. The sector or linear image and the test pattern (grayscale or color), are correctly placed on the video display.

    b. The monitor overlay is correctly placed on the video display when checking sector width.

    c. The bi-level lighting associated with the buttons on the control panel function properly (i.e., the buttons have backlighting that is visible in the dark or in a dimly lit room, they also have a brighter state of illumination after they are pressed).

    d. Rotary switches, slidepots, trackball, and other moveable controls operate smoothly and efficiently.

2C–3.2 System Configuration

1. Perform the following steps to access the PRODUCTION-SERVICE TEST PANEL:

a. Press the SETUP button on the front panel.

b. Press the blank area next to CHANGE SETUPS four times to enter the PRODUCTION-SERVICE TEST PANEL.

2. Press ENGR TEST. The ENGINEERING TEST panel is displayed.

3. Press SOFTWARE VERSION.

4. Verify that the correct software version number is displayed on the left monitor.

5. Press CONFIG TABLE on the ENGINEERING TEST panel. Enter N to answer the prompt “Will the data be modified (Y/N)?”

6. Verify that the features and options listed on the customer order acknowledgement are properly configured. If they are not properly configured, refer to paragraph 5A–3 to configure the system.

7. Press the SETUP button to exit the test panel.

2C–3.3 Warm-up Requirements

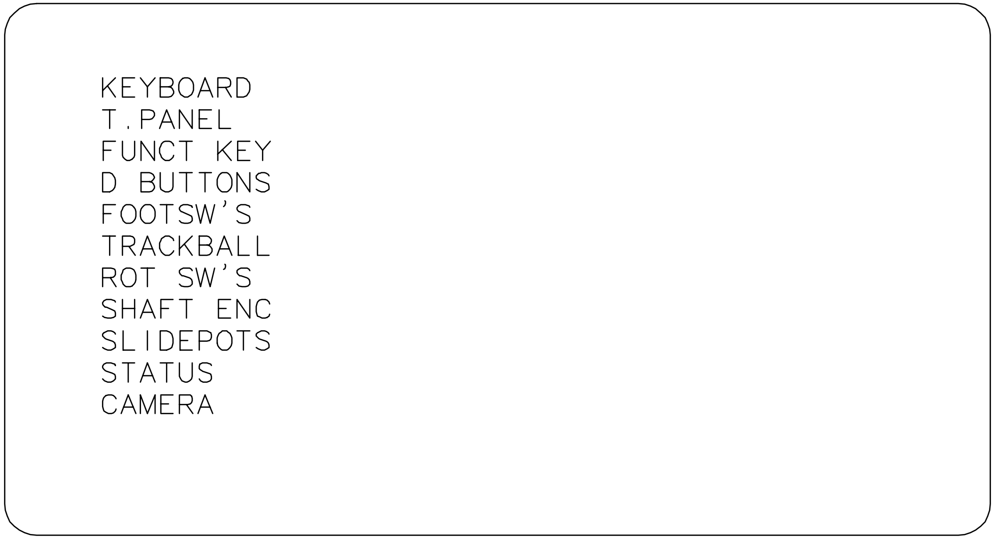
Observe the following warm-up periods before any image quality performance tests.

- System functions: 15 minutes.
- 1010 Matrix Multi Image Camera: 4 minutes
- Aspect Multi-Image Camera: 5 minutes
- P71U Mitsubishi Page Printer: 1 minute
- VY-100A Hitachi Color Page Printer: 1 minute
- YP-870 Sony Printer: 5 minutes

2C–3.4 Control Panel Test

1. On the UM-9 HDI keyboard, hold down the CTRL and SHIFT keys and enter the letter B followed by the letter A. Release CTRL and SHIFT.

2. Verify that the information illustrated in **Figure 2C–2** is displayed on the interactive display.



10 ES02–D02 01

Figure 2C–2. Control Test Panel

3. Verify keyboard operation by typing a series of characters and noticing that the appropriate symbols are displayed on the interactive display after the word KEYBOARD.

   a. Press each alphanumeric key and verify the appropriate character is displayed

   b. Press the arrow keys and verify the appropriate symbols are displayed.

   c. Press SHIFT and verify the shift functions for keys with shift characters.

   d. Press BACKSPACE and verify that  is displayed.

   e. Press ERASE LINE and verify that  is displayed.

   f. Press RETRN and verify that  is displayed.

4. Press each of the 16 rectangular keys on the membrane overlay of the interactive display. Verify that the numbers 4_H through F_H are displayed following T. PANEL.

5. Press ANNOT ON/OFF, PATNT DATA, and ERASE SCRN on the keyboard. Verify that the numbers 0, 1, and 2 are displayed in sequence following FUNCT KEY.

6. Press each of the dedicated buttons on the control panel. Verify the test value for each button is displayed in one of three locations to the right of D BUTTONS on the interactive display. (**Table 2C–2**).

7. Press each of the footswitches to the first and then second position. Verify the test value for each footswtich position is displayed to the right of FOOTSW'S on the interactive display **Table 2C–3**.

Table 2C–2. D BUTTON Test Values

Location	D BUTTON	Value
1	FREEZE	4
	RECORD LEFT	5
	RECORD ACTIVE	2
	RECORD RIGHT	6
2	2D	0
	M	1
	DOP	2
	COLOR	3
	XDCR	4
	SETUP	5
	CALC	6
3	ENTER/FOCAL	0
	SET/TBALL	1
	PRINT LEFT	L

	PRINT RIGHT	R

Table 2C–3. Footswitch Test Values

Footswitch	Position	Value
Record (left)	Released	00000000
	First	00000001
	Second	00000011
Freeze (middle)	Released	00000000
	First	00000100
	Second	00001100
Mode (right)	Released	00000000
	First	00010000
	Second	00110000

8. Rotate the trackball. Verify that four pairs of numbers appear on the interactive display next to TRACKBALL.

9. Rotate the trackball to the left. Verify that the first signed number pair is negative, and that the first number pair in parenthesis decreases in value, resets, and repeats.

10. Rotate the trackball to the right. Verify that the first signed number pair is positive, and that the first number pair in parenthesis increases in value, resets, and repeats.

11. Rotate the trackball toward the monitors. Verify that the second signed number pair is positive, and that the second number pair in parenthesis increases in value, resets, and repeats.

12. Rotate the trackball toward the slide pots. Verify that the second signed number pair is negative, and the second number pair in parenthesis decreases in value, resets, and repeats.

13. Rotate the DEPTH control clockwise. Two number pairs appear next to ROT SW's on the interactive display. Verify that the sign of the first number pair is positive, and that the number pair in parenthesis increases in value, resets, and repeats.

14. Rotate the DEPTH control counterclockwise. Verify that the sign of the first number pair is negative, and that the number pair in parenthesis decreases in value, resets, and repeats.

15. Repeat steps 13 and 14 for the OUTPUT control.

16. Rotate the 2D/M GAIN control clockwise. Two number pairs appear next to SHAFT ENC on the interactive display. Verify that the sign of the first number pair is positive, and that the number pair in parenthesis increases in value, resets, and repeats.

17. Rotate the 2D/M GAIN control counterclockwise. Verify that the sign of the first number pair is negative, and that the number pair in parenthesis decreases in value, resets, and repeats.

18. Repeat steps 16 and 17 for the DOPPLER GAIN and COLOR GAIN controls.

19. Move all eight SLIDEPOTS to the far left. Verify that the eight values on the interactive display adjacent to the annotation SLIDEPOTS are 00.

20. Move each SLIDEPOT through its full range. Verify that the value for each SLIDEPOT increases until it reaches a value of FF when the SLIDEPOT is moved to the far right, and then decreases to 00 when it is returned to the far left.

NOTE: At the completion of the control panel test, the interactive display should contain information similar to that shown in **Figure 2C–3**.

21. STATUS: software engineering tool, not for field service use

22. CAMERA: used to check logic states in the front panel. Results are displayed on the interactive display.

23. To leave the control panel test: While holding down the CONTROL and SHIFT keys on the keyboard, enter the letter B followed by the letter A, release the CONTROL and SHIFT keys.

KEYBOARD	UM9COLRFLO							
T.PANEL	123456789A							
FUNCT KEY	2							
D BUTTONS	6			6			R	
FOOTSW'S	00000000							
TRACKBALL	+ 00 – 00			(2E) (FD)				
ROT SW'S	+ 02 (01)			+ 02 (60)				
SHAFT ENC	+ 05 (8A)			+ 02 (9F)			– 02 (00)	
SLIDEPOTS	00	00	00	00	00	00	00	00
STATUS								
CAMERA								

10 ES02–D04 01

Figure 2C–3. Control Panel Test (Typical Test Result Format)

2C–3.5 Video Monitor Setup

The following procedure is used not only to setup the monitors for optimal viewing, but also to check the range of contrast and brightness of the monitors. Linearity is also tested.

1. On the PRODUCTION-SERVICE TEST PANEL, press VIDEO PR TEST.

2. On the VIDEO PROCESSOR TEST panel, press GRAY SHADES.

3. On both monitors set BRIGHTNESS fully counterclockwise and rotate CONTRAST fully counterclockwise. Verify that the video display has a flat black appearance.

4. Rotate CONTRAST fully clockwise. On the monochrome monitor, verify that the white parts of the video display bloom. On the color monitor, verify that the level of contrast varies.

5. Readjust CONTRAST for correct contrast (i.e., sixteen grayshades and no blooming).

6. On the monochrome monitor, rotate BRIGHTNESS fully counterclockwise. Verify that the video display becomes completely dark. (If it does not, then adjust CONTRAST slightly counterclockwise until it does.)

7. On the monochrome monitor, rotate BRIGHTNESS fully clockwise. Verify that the video display is washed out (there appears to be relatively little contrast).

8. With the room lighting set to normal scanning conditions, readjust BRIGHTNESS and CONTRAST controls for customer approval and the best image:

   a. sixteen grayshades
   b. no blooming
   c. black grayshade almost blends with background

9. Press MONITOR BALANCE, and verify that a black background with a white rectangle in the center is displayed on both monitors (monochrome and color), and that both monitors are approximately equal in appearance with respect to black and white values.

10. Press FLAT BLACK. Verify the following:

    a. The color monitor matches the monochrome monitor with respect to color (grayness) and intensity.

    b. The grayness of the color monitor display is not tinted with another color (i.e., reddish brown, blue, or green).

11. Press CROSS HATCH. Verify the following:

    a. On NTSC systems, the crosshatch pattern appears centered vertically and horizontally. On PAL systems, the crosshatch pattern is centered horizontally and occupies the top three-fourths of the display (a blank area is displayed at the bottom).

b. The horizontal and vertical lines appear straight (within ± 0.5 mm).

c. All of the boxes appear to be about the same size

12. Press COLORBAR RGB. Verify the following:

a. A color test pattern appears on the color monitor.

b. The colors are arranged as follows from left to right across the video display: white, yellow, light blue, green, violet, red, dark blue.

c. Each individual color appears vivid and uniform.

13. Return to 2D CONTROLS.

a. If a sector scanhead is connected, verify the sector image angle is 90 ± 1 degree using the monitor overlay.

b. If a linear scanhead is connected, use the measurement calipers to verify the image width is 38.4 ± 0.1 mm

2C–3.6 Keyboard Test

1. Press ANNOT ON/OFF, and verify the following:

    a. The annotation cursor appears on the left and right monitors.

    b. The trackball controls the cursor.

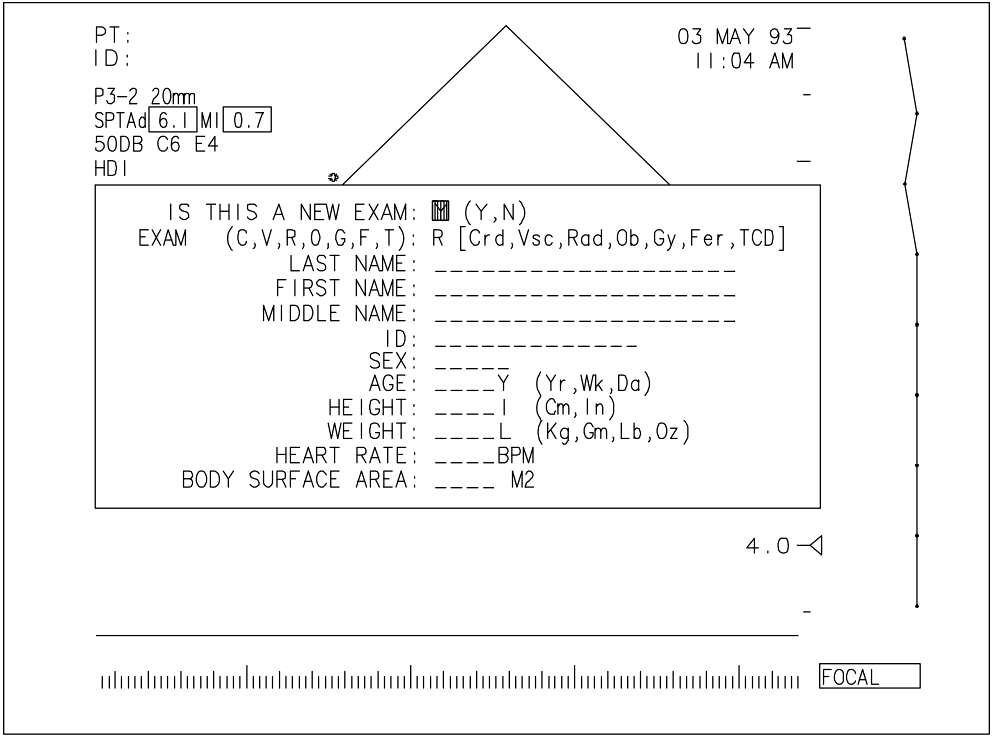
    c. The trackball annotation reads ANNOTATE.

2. Verify that the cursor direction keys move the annotation cursor.

3. Verify that PATNT DATA displays the form shown in **Figure 2C–4**.

4. Verify the alphanumeric functions of the keyboard.

5. Press PATNT DATA to remove the patient data form.



10 ES02–D05 02

Figure 2C–4. PATNT DATA FORM

2C–4 Setup

Setup allows you to change the state of certain setup parameters. When a group of setup parameters are selected, a list is displayed on the left monitor.

Use the trackball to move a cursor to select a setup parameter.

Use the SET button to select the next state of the selected setup parameter.

Use the ENTER button to select the previous state of the setup parameter.

1. Press the SETUP button.

2. Press SET DATE AND TIME.

3. Set the current date using the keyboard. Include leading zeros where necessary.

4. Set the time in the same manner.

5. Press SET DATE AND TIME again to enter the data. Verify that the correct date and time are displayed on both monitors.

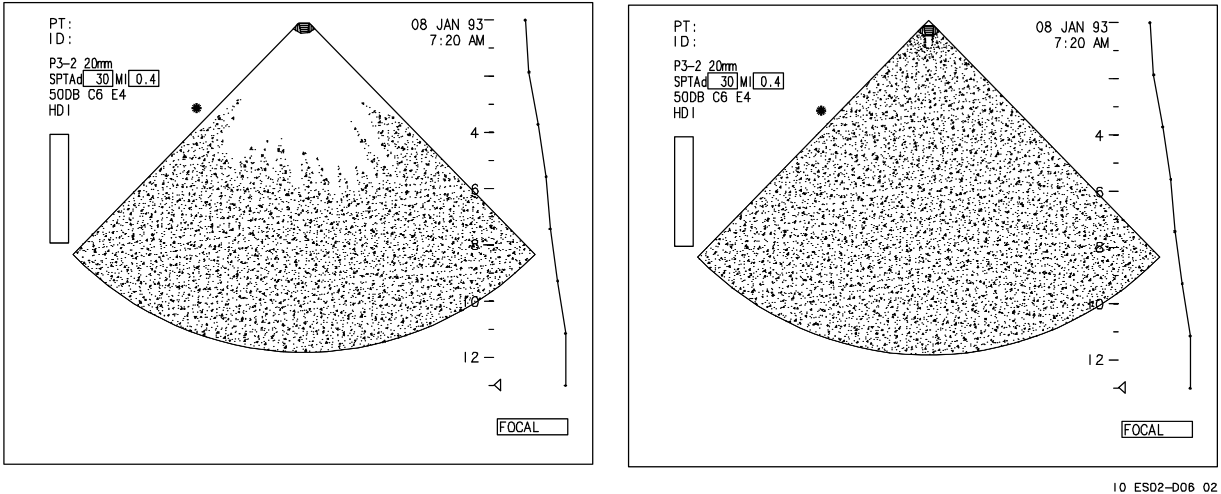
6. Note the time. Turn off power to the system, wait at least 30 seconds, and turn on power. Verify that the correct time is displayed after system initialization.

2C–5 2D Tests

2C–5.1 Gain, Output, and Depth

1. Press the 2D button, if necessary, to select 2D mode, and obtain a phantom image.

2. Rotate the 2D/M GAIN control through its full range of motion, and verify that the number of echoes in the image varies (**Figure 2C–5**).



– LOW GAIN – – HIGH GAIN –

Figure 2C–5. Gain Range

3. Move each SLIDEPOT through its full range of motion and verify that the slope of the line segment associated with each SLIDEPOT responds. Also verify that the image display responds to the change in TGC in the region that is associated with the respective SLIDEPOT (**Figure 2C–6**).

NOTE: Some linear array scanheads will not be affected by movement of the first two slidepots.

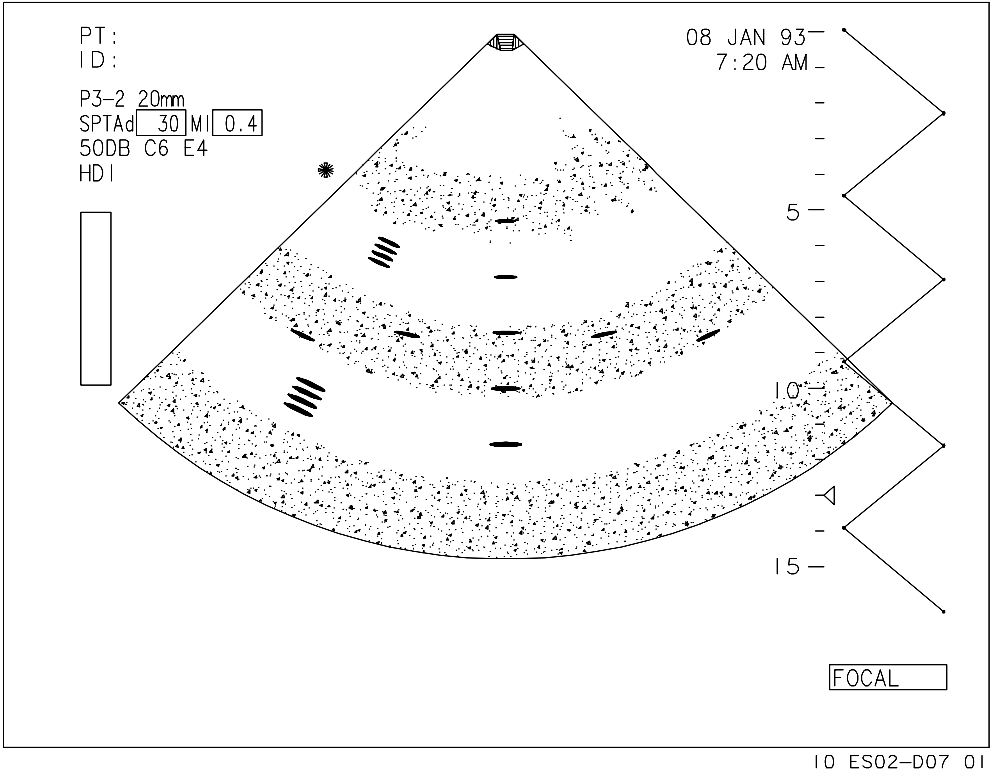


Figure 2C–6. Slidepot TGC Variation

4. Rotate the OUTPUT rotary control counterclockwise to set SPTAd to 0.0, and verify that the image contains no echo information. Also verify that at the extreme counterclockwise setting an audible click is emitted from the control panel speaker. (If the TGC slidepots are full left, there will be no noise in the sector; if the TGC slidepots are not full left, there will be noise in the sector.)

5. Rotating the OUTPUT rotary control clockwise, verify that the SPTAd value increases in discrete steps. Verify that at the extreme clockwise setting an audible click is emitted from the control panel speaker.

6. Rotate the DEPTH rotary control (**Figure 2C–7**). Verify the following:

   a. Depth markers change to reflect the change in DEPTH setting.

b. Image frame rate (FR # HZ) increases or decreases as DEPTH limit decreases or increases (press LINE DENSITY, if necessary, to display FR annotation).

c. At the extreme DEPTH settings an audible clicking is emitted from the speaker.

7. Press IMAGE PROCESS. Verify the following:

   a. Each processing curve changes the grayscale assignment of the image and the graybar.

   b. Display annotation is updated accordingly.

   c. The processing curves can be changed in live or freeze.

8. Select processing curve 3.

9. Press DYNAMIC CONTRAST ENHANCEMENT. Verify the following:

a. As the level of enhancement is increased from E0 through E7, the phantom image becomes smoother and that low to mid-level echoes move in slow motion in response to scan-head movement or depth changes.

b. High level echoes are updated faster, but also fade out in slow motion.

c. Any slight scanhead shimmer or far field noise is averaged out.

10. Select enhancement level E0.

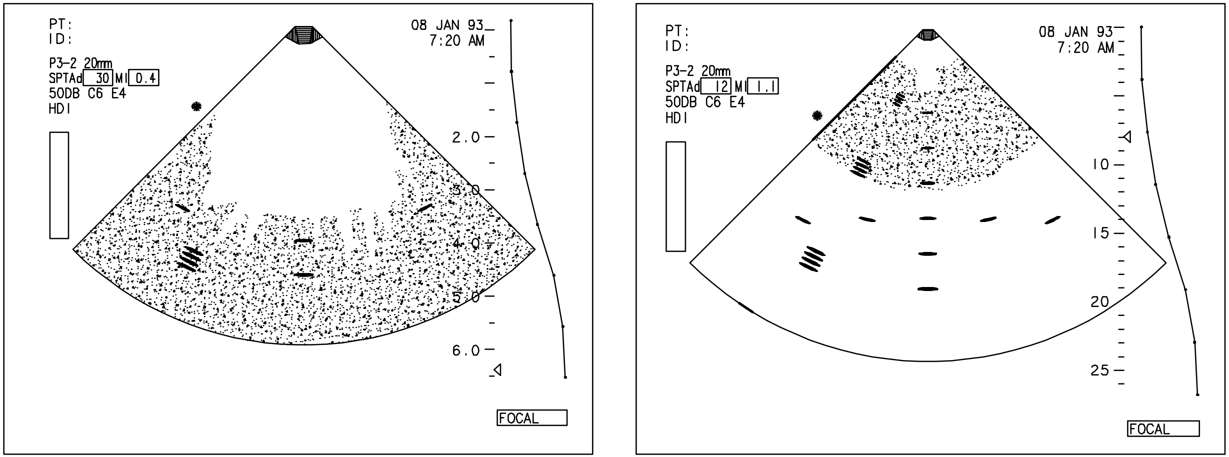
11. Press DYNAMIC RANGE. Verify the following:

a. Dynamic range changes from 35 dB to 60 dB in 5 dB steps.

b. Dynamic range cannot be changed in freeze.

c. A high dynamic range causes the scatter echoes to smooth out in grayshade.

d. The pins in the phantom appear at a lower echo level (the echoes are not as bright) at higher dynamic ranges.



– MINIMUM – MAXIMUM –

Figure 2C–7. Depth Range

2C–5.2 Freeze

1. Press FRZ, and verify that the image freezes.

2. Manipulate the TGC slidepots, 2D/M GAIN, OUTPUT, and DEPTH; verify that they do not affect the image display.

3. Verify that the measurement cursors can be enabled (press the CALC button), and that they can be used while the image is frozen.

4. Press FRZ.

2C–5.3 Measurements and Trackball

1. Press PATNT DATA on the keyboard.

2. Verify that C is the selected exam type.

3. Press the CALC button on the front panel.

4. If the 2D MEASUREMENTS AND CALCULATIONS Panel is not displayed, press 2D CALCS to display it.

5. Verify that the CALC button is illuminated.

6. Verify that the display includes a single cursor, distance graphics, and the trackball status annotation Measure.

7. Using the trackball, move the single cursor up and down, then side to side. The cursor should move in a smooth, linear fashion.

8. Verify that the trackball rotates freely without binding.

9. Position the cursor over one of the depth marker graphics.

10. Press the SET button on the front panel. Verify that a second cursor is displayed on the monitor.

11. Position the second cursor over a depth marker 2 cm from the first marker.

12. Press the ENTER button on the front panel.

13. Verify that the distance annotation displayed on the monitor is 2.00 cm ± 0.1 cm.

2C–5.4 Registration Accuracy

1. Press the FRZ button to unfreeze the image.

2. Couple a probe to the RMI phantom and obtain an image that clearly shows both the horizontal and the vertical rows of pins.

3. Position the probe so that all pins can be seen, ensuring that the scanning plane is perpendicular to the pins. Adjust so all pins can be viewed, with each pin indicating minimum width on the sector image.

4. Press the FRZ button to freeze the image.

5. Press the CALC button on the front panel.

6. Measure the distance between any two pins in the vertical row that are spaced 2 cm apart.

    a. Use the trackball to position the cursor to the measurement start point. Place the cursor in the center of the pins.

    b. Press the SET button.

    c. Use the trackball to position the cursor to the measurement end point. Place the cursor in the center of the pins.

    d. Press the ENTER button on the front panel to fix the measurement.

7. Repeat step 6 for any two pins in the horizontal row that are spaced 3 cm apart.

8. Verify that the distance annotation displayed on the monitor for the horizontal and vertical planes is within the specified tolerance for the scanhead in use (see **Table 2C–4**).

9. Repeat this procedure for all system-compatible scanhead types.

Table 2C–4. Registration Accuracy Tolerances

Plane	Linear	Curved	CIVT	Annular	Phased	P3.5
Vert.	±0.08cm	±0.08cm	±0.08cm	±0.08cm	±0.08cm	±0.08cm
Horiz.	±0.14cm	±0.14cm	±0.17cm	±0.14cm	±0.14cm	±0.17cm

2C–5.5 Biopsy Guides

NOTE: Biopsy guides are not allowed with phased array scanheads.

1. Press BIOPSY GUIDE. Verify that the biopsy guides are displayed correctly.

2. Verify that the trackball moves the biopsy cursor.

3. Press BIOPSY GUIDE to remove the biopsy guides from the display.

2C–5.6 Cineloop Test

1. While moving the scanhead on the RMI 413 phantom, press the FRZ button. Verify that CINELOOP (R) REVIEW is displayed in the upper right corner of each screen.

2. Move the trackball from side to side to play the captured frames.

3. On the 2D CONTROLS panel, press CINELOOP REVIEW.

4. Press 2D REVW STRT/STP. Verify that the captured sequence plays back on both monitors.

5. Press DUAL CINELOOP. Verify that the dual Cineloop format is displayed on the right monitor.

6. While moving the scanhead on the phantom, press the FRZ button to capture a sequence.

7. Press ACQUIRE LT/RT, and capture another sequence as in step 6.

8. Press the FRZ button.

9. Press 2D REVW STRT/STP. Verify that both captured sequences play.

10. Press DUAL CINELOOP and then RETURN to return to 2D.

2C–5.7 Save-Recall Test

1. Press SAVE-REC IMAGE.

2. Save different images in all available image memory cells.

3. Recall all saved images, and verify that they are accurately recalled.

4. Press CLEAR ALL on the SAVE-RECALL IMAGE panel, and verify that the image memory cells have been cleared.

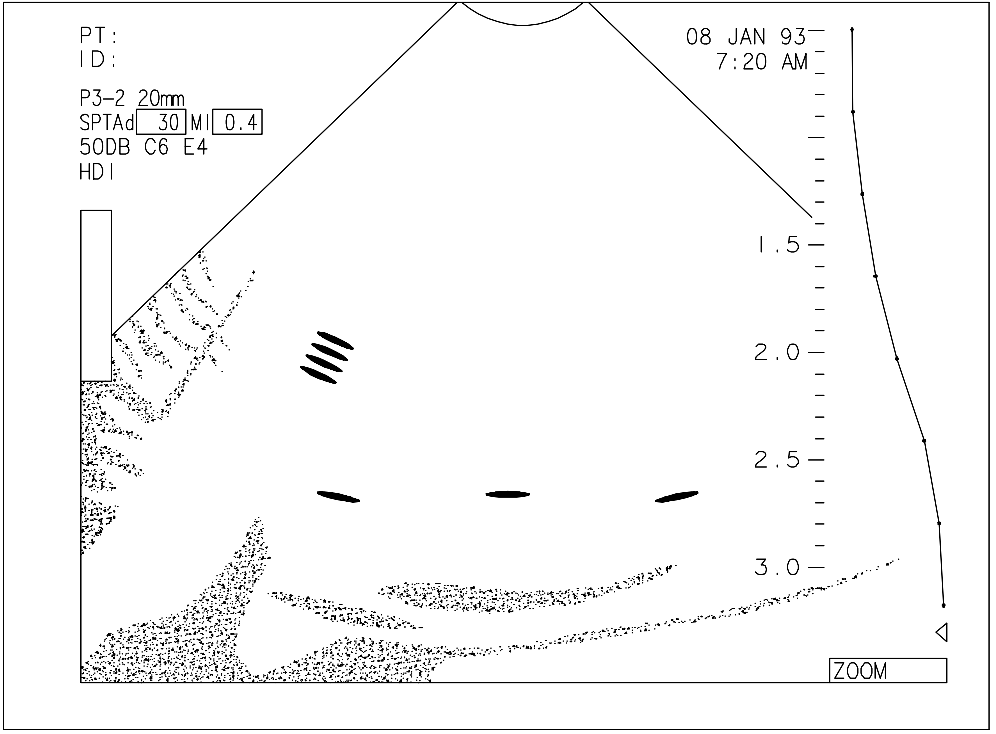
5. Press RETURN to return to the 2D CONTROLS panel.

2C–5.8 Zoom

1. Press ZOOM MAGNIFICATION ⬆ to enable zoom (**Figure 2C–8**). Verify that the trackball is now attached to the zoom function, and that it moves the sector or linear display.

2. Freeze the image, and verify that the trackball now controls Cineloop review playback.

3. Press ZOOM OFF, and verify that the image returns to normal and the trackball is attached to the previous assignment.



10 ES02–D09 01

Figure 2C–8. Zoom

2C–6 Annular Array

2C–6.1 Scanhead Control

1. Connect the A6–3 annular array scanhead to the system.
2. Press the XDCR button to access the TRANSDUCER SELECT panel, and enable the annular array scanhead.
3. Perform steps 1 through 11, paragraph 2C–5.1.

2C–6.2 Focal Zones and Focal Depth

If the trackball is not attached to the FOCAL marker, then press ENTER (FOCAL) on the trackball switch. Verify the following:

1. Trackball status annotation reads FOCAL.
2. Trackball control is attached to the transmit focal depth marker.
3. The trackball can be used to position the focal depth.

4. There are no artifacts or imaging anomalies at any available depth setting when the focal depth is varied from minimum to maximum.

2C–6.3 Frame Rate and Depth

1. While holding the scanhead with the tip up, press 2D FRAME RATE on the 2D CONTROLS panel, and verify the following:

   a. Scanhead motor changes speed.

   b. Rate of image update changes.

   c. Image frame rate (FR # HZ) increases or decreases.

2. Vary the DEPTH control. Verify the following:

   a. Scanhead motor speed increases as depth limit decreases.

   b. Scanhead motor speed decreases as depth limit increases.

2C–7 Phased Array

2C–7.1 Scanhead Control

1. Connect a phased array scanhead to the system.

2. Press the XDCR button to access the TRANSDUCER SELECT panel, and enable the scanhead.

3. Perform steps 1 through 11, paragraph 2C–5.1.

2C–7.2 Focal Zones and Focal Depth

1. Press the trackball ENTER button until the trackball status annotation reads FOCAL.

2. Press # FOCAL ZONES. Verify the following:

   a. Trackball control is attached to the transmit focal zone depth marker.

b. The trackball can be used to position the focal zone depth marker.

c. Five focal zone depth markers can be displayed and positioned.

d. There are no artifacts or imaging anomalies (seams between focal zones) at any available depth setting when the focal depth is varied from minimum to maximum.

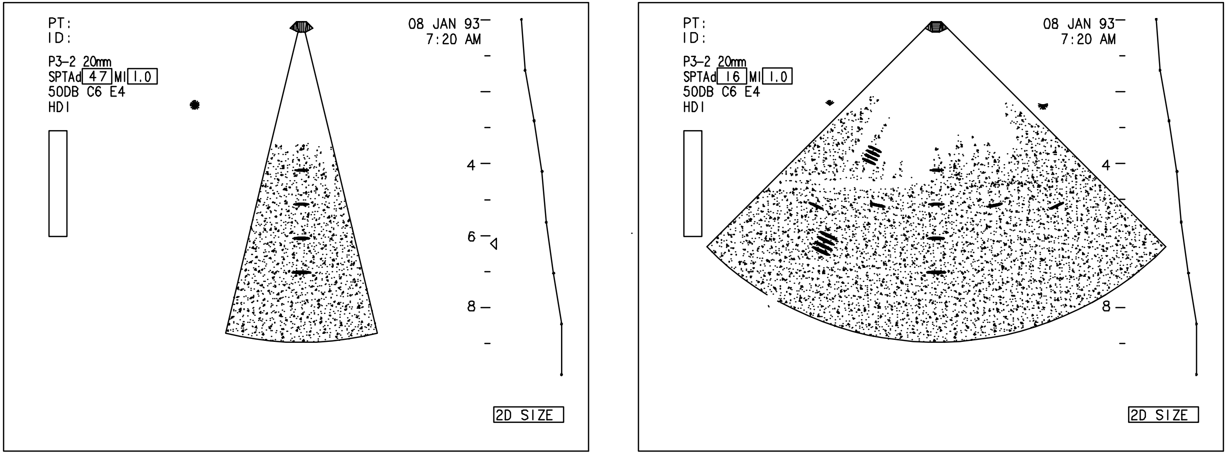
2C–7.3 Sector Width

1. Press SECTOR WID on the 2D CONTROLS panel.

2. Verify that the sector angle changes as you move the trackball (**Figure 2C–9**).

3. Verify that the frame rate increases at the smaller sector angle.

4. Verify that there is no degradation in image quality at all depths, focal zones, and dynamic ranges.



– MINIMUM – – MAXIMUM –

10 ES02–D10 01

Figure 2C–9. Focal Zones, Sector Angle

2C–7.4 Frame Rate and Depth

1. While holding the scanhead with the tip up, press 2D FRAME RATE on the 2D CONTROLS panel, and verify the following:

   a. Rate of image update changes.

   b. Image frame rate (FR # HZ) increases or decreases.

2C–8 Linear Array and Curved Array

2C–8.1 Scanhead Control

1. Connect a linear array or curved array scanhead to the system.

2. Press the XDCR button to access the TRANSDUCER SELECT panel, and enable the scanhead.

3. Perform steps 1 through 11, paragraph 2C–5.1.

2C–8.2 Focal Zones and Focal Depth

1. Press the trackball ENTER button until the trackball status annotation reads FOCAL.

2. Press # FOCAL ZONES. Verify the following:

   a. Trackball control is attached to the transmit focal zone depth marker.

   b. The trackball can be used to position the focal zone depth marker.

   c. Five focal zone depth markers can be displayed and positioned.

   d. At all available depth settings vary the focal depth from minimum to maximum and verify that there are no artifacts or imaging anomalies (e.g., seams between focal zones).

2C–8.3 Frame Rate and Depth

Refer to the procedure in paragraph 2C–7.4.

2C–9 M-Mode

2C–9.1 Duplex M-Mode

1. From 2D mode, press the M button.

2. Press DUPLEX/SIMULT on the M-MODE CONTROLS panel, if necessary, to select Duplex mode. Verify the following:

   a. Depressing the Mode footswitch (right footswitch connector) to the first level activates the M-mode display.

   b. Releasing the Mode footswitch stops the M-mode display.

3. Press M on the control panel a second time. Verify the following:

a. M-mode data scrolls across the right monitor.

b. Updating of the 2D image on the left monitor stops.

c. TGC controls, DEPTH, and OUTPUT correctly affect the M-mode display.

d. Separate OUTPUT values can be maintained between 2D and M-mode.

e. A single DEPTH value is maintained between 2D and M-mode.

4. Rotate the trackball to the left and then to the right. Verify that the M-line sweeps back and forth across the 2D image in a motion that corresponds to the movement of the trackball.

5. Obtain an RMI 413 phantom image on the 2D display. Use the TGC controls to accentuate the phantom depth pins so that they are discernible on the M-mode display. Verify the following:

a. EDGE ENHANCE eliminates lower level echoes from the M-mode display.

b. The EDGE ENHANCE annotation is displayed properly.

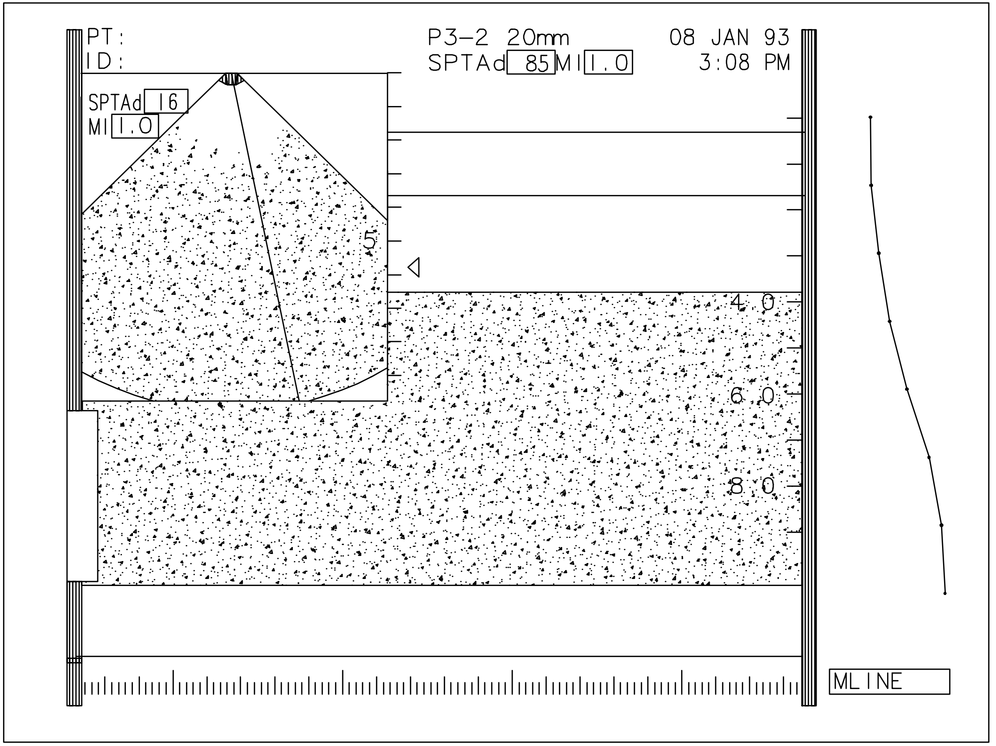
6. Verify that SWEEP SPEED varies the speed of the M-mode scrolling display in three steps. Verify that when the sweep speed changes, there are two arrows displayed on the M-mode scrolling display to indicate the point at which the change occurred.

7. Press SPLIT SCREEN and verify the following:

   a. A reduced-size 2D image is overlaid on the M-mode display (**Figure 2C–10**).

   b. There is no degradation in the 2D image.

   c. Pressing SPLIT SCREEN a second time returns the 2D display to the left monitor.



10 ES02–D11 01

Figure 2C–10. Split Screen M-Mode

2C–9.2 Simultaneous M-Mode (Phased and Linear Only)

1. Press DUPLEX/SIMULT on the M-MODE CONTROLS panel. Verify the following:

    a. Duplex annotation on the left monitor directly above the graybar changes to SIMULT.

    b. The M-mode display is active, a real-time 2D display is active.

    c. There is no degradation in the 2D or M-mode image quality at any depth setting.

2. Press DUPLEX/SIMULT to return to Duplex mode.

2C–9.3 M-Mode Zoom

1. With scrolling M-mode displayed, press ZOOM MAGNIFI-CATION (up). Verify that the M-line on the 2D image is short-

ened and that the depth scale on the M-mode display corresponds to 2D depth.

2. Press ZOOM (up) again four times and verify that the M-line and depth scale continue to correspond.

3. Press ZOOM OFF and verify that the M-line and depth scale return to their original conditions.

4. Press the 2D button to return to 2D mode.

2C–10 ECG/Physio

2C–10.1 ECG

1. Connect an ECG harness or an ECG simulator to the ECG jack.

2. Connect the ECG harness to the subject (the technician performing the test may also act as the subject for the test, or an ECG simulator may be used).

3. Press the SETUP button, and then press ECG-PHYS CONTROLS. On the ECG/PHYSIO panel, press 2D ECG to turn ECG on. Verify the following:

    a. The ECG trace is displayed beneath the 2D display.

    b. TRIGG A ON/OFF enables a single ECG trigger.

    c. The trigger can be moved along the ECG trace with TRIGGER A DELAY.

    d. Depressing the Mode footswitch to the first level results in a 2D update at the trigger point.

    e. Releasing the Mode footswitch returns the system to the normal update rate.

4. Press TRIGGER B ON/OFF. Verify the following:

    a. Two triggers are displayed on the ECG trace.

b. The second trigger can be moved along the ECG trace with TRIGGER B DELAY.

c. Depressing the Mode footswitch to the first level results in a 2D update at both trigger points.

d. Releasing the Mode footswitch returns to the system to the normal update method.

NOTE: Before disconnecting the ECG harness, continue with the following test.

2C–10.2 Heart Rate

1. With the ECG harness connected as described in paragraph 2C–10.1, steps 1 and 2, and with 2D mode selected, press the SETUP button.

2. On the ECG–PHYSIO control panel, press 2D ECG ON/OFF. Verify that the ECG trace scrolls across the image.

3. Press HEARTRT ON/OFF. Verify that the HR: annotation and the heart rate are displayed in the lower left corner of the screen.

4. Press 2D ECG ON/OFF and the SETUP button to turn off ECG and return to 2D.

2C–10.3 Pulse

1. Ensure that the system is in a scrolling mode (M-mode or Doppler), and that a pulse transducer is connected.

2. Press PULSE/PHONO on the ECG/PHYSIO PANEL.

3. Press PULSE ON/OFF, and verify that the pulse display appears on the scrolling display.

4. Verify that PULSE GAIN varies the level of pulse signal gain.

5. Verify that PULSE POSITION varies the position of the pulse display (there are four possible pulse positions).

6. Verify that PULSE RESET resets the pulse baseline.

7. Press PULSE ON/OFF to turn off the pulse display.

2C–10.4 Phono

1. Ensure that the system is in a scrolling mode (M-mode or Doppler), and that a phono transducer is connected.

2. On the PULSE/PHONO panel press PHONO ON/OFF, and verify that the phono display appears on the scrolling display.

3. Verify that PHONO GAIN varies the level of phono signal gain.

4. Verify that PHONO POSITION varies the position of the phono display (there are four possible phono positions).

5. Verify that PHONO FILTER selects among four different phono filters (the filter selection is annotated at the bottom of the TGC/Mode display as PH # 1–4 AUD).

2C–10.5 Headphones

1. With an active spectral Doppler display, and while listening to the headphones, press DOP/PHON AUDIO on the PULSE–PHONO panel..

2. Verify that DOP/PHON AUDIO switches between Doppler audio and Phono audio in the headphones.

3. Press PHONO ON/OFF to turn off the phono display.

2C–11 Spectral Doppler

2C–11.1 Pulsed Doppler

1. From 2D mode, press the DOP button. Verify the following:

   a. Depressing the Mode footswitch activates the spectral Doppler display.

b. Releasing the Mode footswitch stops the spectral Doppler display.

2. Press the DOP button a second time and verify the following:

   a. Audio noise comes from the speakers (and headphones).

   b. Doppler data scrolls across the right monitor.

   c. The updating of the 2D image on the left monitor stops.

3. Rotate the trackball forward and backward. Verify that the sample volume cursor moves up and down the Doppler line.

4. Rotate the trackball left and right. Verify that the Doppler line moves back and forth in a motion that corresponds to the motion of the trackball.

5. To simulate flow or target motion, move the scanhead up and down on the phantom keeping the scanhead tip in the water. Verify the spectral display shows corresponding Doppler shift.

Flow toward the transducer (downward movement) produces Doppler audio from the left speaker and flow away from the transducer (upward movement) produces Doppler audio from the right speaker.

6. Press SPLIT SCREEN on the ADDITIONAL DOPPLER CONTROLS panel, and verify the following:

   a. A small 2D image is overlaid on the spectral display.

   b. There is no degradation to the spectral or 2D images.

   c. Pressing SPLIT SCREEN a second time returns the 2D display to the left monitor.

7. Select the next scanhead.

8. Repeat steps 2 through 7 to verify the operation of all other scanheads.

9. Verify the following Doppler functions for an annular array and a phased array scanhead:

   - D SPECTRAL DISPLAY ORIENTATION
   - D BASELINE POSITION
   - D VELOCITY RANGE
   - D WALL FILTER
   - D SAMPLE VOLUME SIZE
   - D VELOCITY/FREQUENCY SELECT
   - D DOPPLER VIDEO INVERT
   - D SWEEP SPEED
   - D UPDATE RATE
   - D SPLIT SCREEN
   - D UPDATE METHOD
   - D DOPPLER GRAYSCALE CURVE

10. Verify the following DOPPLER CONTROLS:

   - D ANGLE CORRECTION

D ANGLE 0/60

D SAMPLE VOLUME SIZE

D VELOCITY RANGE

D BASELINE

D WALL FILTER

D SPECTRAL INVERT

11. Verify the following ADDITIONAL DOPPLER CONTROLS:

D PEAK TRACE

D DISPLAY VEL/FREQ

D MEAN TRACE

D SPLIT SCREEN

D PULSED/CW

D DUPLEX AUTO/SIM

D SWEEP SPEED

D HIGH PRF

D UPDATE RATE

2C–11.2 Spectral Doppler Auto Update

1. Press DUPLEX/AUTO/SIM on the ADDITIONAL DOPPLER CONTROLS panel until AUTOUP appears on the 2D display. Verify the following:

   a. The 2D image updates at the selected update rate.

   b. The update rate can be varied from 1 to 6 seconds in 1 second increments (this is controlled by pressing UPDATE RATE).

2. Press DUPLEX/AUTO/SIM to return to Duplex mode.

2C–11.3 Simultaneous Spectral Doppler (Phased, Linear, and Curved Only)

1. Press DUPLEX/AUTO/SIM on the ADDITIONAL DOPPLER CONTROLS panel until SIMULT appears on the 2D video display. Verify the following:

a. The 2D display continues to update while the spectral display scrolls.

b. There is no degradation in the 2D or spectral image quality at any depth setting.

2. Press SPLIT SCREEN. Verify that the active 2D image is now overlaid on the spectral Doppler display.

3. Press DUPLEX/AUTO/SIM to return to Duplex mode.

2C–11.4 Continuous Wave Doppler (CW Transducer)

1. Ensure that a CW transducer is properly connected.

2. Press XDCR.

3. Select the correct CW transducer from the options available on the TRANSDUCER SELECT panel.

4. Verify that the 2D image is replaced by a scrolling CW Doppler display.

5. Verify operation of the thump filter.

2C–11.5 Steered CW Doppler (P3–2 Scanhead)

1. Connect the scanhead to the system.

2. Press XDCR.

3. Select the correct scanhead from the options available on the TRANSDUCER SELECT panel.

4. Press Pulsed/CW to alternate between pulsed Doppler and CW Doppler acquisition.

5. Rotate the trackball to position the CW LINE and focus indicator.

2C–12 Color

2C–12.1 Color 2D

NOTE: DO NOT perform the color test until the spectral Doppler tests have been performed.

1. Ensure that the system is in 2D mode.

2. Press the COLOR button.

3. Setup the system controls as follows:

   - TGC slidepots: Max (full right)
   - Color Gain: Max (full cw)
   - 2D Gain: Min (full ccw)
   - Depth: Max
   - Output: Max
   - Overlay size: Max width and height (use SET and trackball to adjust)

4. Set controls on the COLOR DOPPLER CONTROLS panel as follows:

   - Color Wall Filter: 100 Hz
   - Baseline: Centered

5. Press COLOR PROCESS and set controls as follows:

   - Color Disp: On
   - Color Sensitivity: 9

- D Persistence: P0
- D Filter Type: D0

6. Perform the following steps to access the PRODUCTION-SERVICE TEST PANEL:

   a. Press the SETUP button on the front panel.

   b. Press the blank area next to CHANGE SETUPS four times to enter the PRODUCTION-SERVICE TEST PANEL.

7. Press CF TEST PATTERN on the PRODUCTION-SERVICE TEST PANEL. Verify the following:

   a. The color test pattern is displayed in the color sector.

   b. The pattern displays a smooth transition from top to bottom without holes or dropout.

c. A black band with some stair step edges should be present in the center of the pattern to indicate proper wall filter operation.

NOTE: Before changing color settings, continue with the following test.

2C–12.2 Color M-Mode

NOTE: Do not perform the color test until the spectral Doppler tests have been performed.

1. Ensure that system controls are still set up as outlined in paragraph 2C–12.1, steps 3 through 5.

2. Press the M button twice.

3. Perform the following steps to access the PRODUCTION-SERVICE TEST PANEL:

   a. Press the SETUP button on the front panel.

b. Press the blank area next to CHANGE SETUPS four times to enter the PRODUCTION-SERVICE TEST PANEL.

4. Press CF TEST PATTERN on the PRODUCTION SERVICE TEST PANEL. Verify the following:

   a. The color test pattern is displayed in the color M-mode display.

   b. The pattern displays a smooth transition from top to bottom without holes or dropout.

   c. A black band with some stair step edges should be present in the center of the pattern to indicate proper wall filter operation.

2C–12.3 Color Capture

1. On the COLOR DOPPLER CONTROLS panel, press CINE-LOOP REVIEW.

2. On the CINELOOP REVIEW panel, press CAPTURE TIME and verify that the capture time displayed on the monitor cycles among 2, 4, and 6 second settings with each key depression.

3. Move the scanhead up and down slightly on the RMI 413 phantom to produce color activity in the color overlay.

4. Press COLOR CAPTURE.

5. Press 2D REVW STRT/STP. Verify that the Cineloop image contains color activity.

6. Press the COLOR button to return to 2D.

2C–13 Frame Grabber

NOTE: Frame Grabber is functional only on systems with 17.05 software and above.

2C–13.1 Image One/Four

1. Press SAVE-REC IMAGE.

2. Press IMAGE ONE/FOUR on the SAVE-RECALL IMAGE panel. Verify that the left monitor assumes the Four images display format.

3. Save images in all available image cells.

4. Verify that the images can be recalled, and verify the following:

   a. NEXT POSITION on the SAVE-RECALL IMAGE panel, when pressed, moves the position cursor to each of the four displayed cells.

b. After all available image cells have been saved and recalled and the function of the position cursor verified, press CLEAR ALL on the SAVE-RECALL IMAGE panel. The annotation PRESS CLEAR ALL AGAIN TO CLEAR MEMORY PRESS ANY OTHER KEY TO ABORT will appear on the right monitor.

5. Press CLEAR ALL a second time to clear the image memory cells.

2C–13.2 Freeze Frame

1. Press SETUP, and then press VCR CONTROLS.

2. Insert a video tape into the UM-9 HDI and record one minute of 2D video, one minute of M-mode video, and one minute of Doppler video. During the recording, change the gain setting and include images with a high amount of white image area. Also include images with inverted video.

3. Play back the test recording. When the playback video is stable, press FREEZE FRAME on the VCR CONTROLS panel. Verify the following:

   a. The video display is frozen.

   b. The FREEZE FRAME panel appears on the interactive display.

   c. The interactive display indicates that the VCR is in PAUSE.

   d. On systems with 17.05 software, the right monitor displays the following message to give the operator the opportunity to update the patient name and ID:

      Name:
      ID:
      All analysis and measurements will be combined with the current patient. Does this patient name and ID match the patient name and ID shown on the tape? If not, exit VCR playback and re-enter the correct patient name and ID.

e. Using the functions on the measurements panel, measurements can be performed with the same accuracy as during live measurements.

NOTE: Hidden digital software is different for the old and new versions of Frame Grabber software. Consequently, VCR-taped images recorded on systems using the old Frame Grabber software cannot have measurements made on them using 17.05 software. The opposite is also true: VCR images recorded on 17.05 systems cannot have measurements made on them using the old software. However, the digital directory on tapes recorded with the old Frame Grabber is compatible with the new software.

f. Annotation can be overlaid on the frozen image.

g. A hardcopy recording can be made of the Freeze Frame image.

h. Each kind of image (2D, M-mode, and Doppler; standard and inverted) can be grabbed, and the correct measurement panel is presented when the CALC button is pressed.

NOTE: Occasionally an image will not be grabbed, or the Measurement Not Allowed message may be displayed. This condition indicates that the data was not recovered properly. This may be due to the condition or quality of the tape.

4. Press RETURN to return to the VCR CONTROLS panel. Press STOP and then EJECT.

2C–13.3 VCR Directory Functions

1. For systems with Tape Directory configured, check the VCR Directory functions with a blank or scrap tape. Insert the tape.

2. Enter N on the alphanumeric keyboard in response to the prompt DOES THIS TAPE HAVE A DIRECTORY ON IT? (Y/N).

3. Press NEW TAPE on the VCR CONTROLS panel.

4. Verify that the message DO YOU WISH TO PROCEED? (Y/N) appears on the left monitor. Press Y on the alphanumeric keyboard in response to this message.

5. Verify that the VCR starts to record and the VCR directory is displayed on the monitor. Verify that after approximately 50 seconds the monitor returns to its original state and the VCR stops recording.

6. Press PATIENT DIRECT, and verify the VCR DIRECTORY appears on the monitor.

7. Press PATNT DATA and enter patient information. Verify that the patient information just entered appears in the patient data fields on the screen.

NOTE: On 17.05 software and above, the Mark Tape function is not operational. When verifying operation of these systems, continue with this procedure ignoring the steps pertaining to Mark Tape.

8. To simulate a typical exam, record approximately 3 minutes of 2D, M-mode, and Duplex/Doppler. Before each mode change—from 2D to M-mode, and M-mode to Duplex/Doppler—press MARK TAPE.

9. Press STOP on the VCR FUNCTIONS panel to end the exam.

10. Repeat the process of patient data entry, mode change, and mark tape for two additional exams.

11. Press PATIENT DIRECT on the VCR FUNCTIONS panel and verify that the VCR DIRECTORY appears on the monitor and that the information is correct.

12. Verify that the PREVIOUS PATIENT/NEXT PATIENT selections on the PATIENT DIRECTORY panel allow control over the VCR DIRECTORY cursor.

13. Select any one of the patient exams with the PREVIOUS PATIENT/NEXT PATIENT selections, and then press DISPLAY PATIENT on the PATIENT DIRECTORY panel. Verify that the data that was previously entered during patient data entry is displayed on the monitor.

14. Verify that the correct number of marks for that patient is displayed on the monitor (one count for each mark entered during the exam).

15. Press POSITION TAPE and verify that the VCR enters the SEARCH mode and searches to the start of the selected exam.

Verify that the VCR then enters the PAUSE mode and that the VCR video is displayed on the right monitor.

16. Press NEXT MARK on the PATIENT DIRECTORY panel and verify that the VCR enters the SEARCH mode and searches until it reaches the next mode change (mark). Verify that the VCR enters the PAUSE mode.

17. Press ERASE MARK and verify an audible tone from the system.

18. Press DISPLAY PATIENT on the PATIENT DIRECTORY panel, and verify that the mark count has decreased by one.

19. Press ERASE MARKS on the PATIENT DIRECTORY panel, and verify that a message appears on the monitor. Press Y on the alphanumeric keyboard in response to the query.

20. Press DISPLAY PATIENT on the PATIENT DIRECTORY panel, and verify that the MARKS: 000 annotation is displayed.

21. Press STOP on the VCR FUNCTIONS panel.

22. Press EJECT on the VCR FUNCTIONS panel. Verify that the VCR rewinds to the start of the tape and records the new patient data entered on the directory. (After the recording is complete the tape will be ejected.)

    a. Insert the tape into the VCR.

    b. Press Y on the alphanumeric keyboard in response to the directory prompt message on the monitor.

    c. Press PATIENT DIRECT on the VCR FUNCTIONS panel, and verify that the directory is displayed accurately on the monitor.

2C–14 Image Quality Tests

NOTE: All features need not be tested with all types of scanheads (e.g., the VCR can be tested with only one scanhead type and frequency); however, critical imaging parameters (e.g., image quality) must be checked for all scanhead types and frequencies available to the user.

NOTE: Always check the customer scanhead when available, and use a substitute scanhead when the type or frequency of scanhead called for is not with the system.

2C–14.1 Annular Array Scanhead

1. In 2D mode, set the controls as follows:

   - OUTPUT: Maximum
   - DYNAMIC RANGE: 50 dB
   - PROCESSING CURVE: 1
   - DYNAMIC CONTRAST ENHANCEMENT: E0
   - ZOOM: OFF

2. Cover the phantom surface with about 1/8 inch (3 mm) of water.

3. Position the scanhead on the phantom, and adjust 2D GAIN, TGC, and DEPTH as follows:

   a. Adjust the TGC controls for uniform grayscale echoes.

   b. Adjust DEPTH to 20 cm.

c. Adjust 2D GAIN so that the far field noise does not interfere with the scatter echo recognition.

4. Set FOCAL DEPTH to 19 cm.

5. Evaluate the image for each of the following qualities:

   a. Jerk must be less than half the width of a depth marker pin at 4 cm depth. (Jerk is defined as the left-right swinging of the image.)

   b. Jello must be less than half the width of a depth marker pin at 4 cm depth. (Jello is defined as the left-right swimming or shimmering of the image.)

   c. There must be minimal electrical noise (fewer than five instances per sector scan). (Electrical noise is defined as randomly placed short-lived dots that are larger than pixels and appear most often in the far field.)

d. There must be minimal scanhead motor noise (fewer than three instances per sector scan). (Scanhead motor noise is defined as short-lived dots similar to static noise but occurring along radials and not necessarily confined to the far field.)

6. Set the DEPTH to the minimum value allowed for the scanhead. Verify that there is no sector break-up. (Sector break-up is defined as a vigorous left-right shaking of the image, giving the appearance of inconsistent timing in sector presentation. Unless the problem is severe, it will not be noted at higher depth settings.)

7. Press FRZ and evaluate the frozen image for the following qualities:

   a. The depth markers along the right side of the monitor display must agree with the phantom depth marker pins. Compensation must be given for down-shifting of pins due to scanhead pressure on the phantom bulge.

b. Scatter echoes must exist past a minimum depth allowed for the scanhead (see **Table 2C–5**).

Table 2C–5. Annular Array Penetration

Scanhead	Penetration (cm)
A6–3	10.5

8. Press CALC and use the trackball to move one cursor next to a centimeter marker within the image.

9. Press SET. Use the trackball to move the other cursor to a centimeter marker 6 centimeters from the first cursor (ensure both cursors are within the image). Verify that the measurement displayed on the right monitor is 6 cm ± 0.075 cm.

2C–14.2 Phased Array Scanheads

1. In 2D, set the controls as follows:

   - OUTPUT: Maximum
   - DYNAMIC RANGE: 40 dB
   - PROCESSING CURVE: 3
   - DYNAMIC CONTRAST ENHANCEMENT: E0
   - ZOOM: OFF

2. Cover the phantom surface with about 1/8 inch (3 mm) of water.

3. Position the scanhead on the phantom, and adjust 2D GAIN, TGC, and DEPTH as follows:

   a. Adjust the TGC controls for uniform grayscale echoes.

   b. Adjust DEPTH so that the top and bottom boundaries of solid scatter echoes are viewed within the sector.

NOTE: The P7 scanhead will not meet this requirement because it does not have sufficient penetration.

c. Adjust 2D GAIN for maximum or so that the far field noise does not interfere with the scatter echo recognition.

4. Set # FOCAL ZONES to 1.

5. Use the trackball to set the focal depth to the setting that provides the maximum observed penetration.

6. In paragraph 2C–14.1, perform steps 5c through 9 and verify that penetration corresponds to those shown in **Table 2C–6**.

Table 2C–6. Phased Array Penetration

Scanhead	Penetration (cm)
P3–2	12.0
P3.5	10.0
P7	4.5
P5–3 (Level 5)	9.5

7. Slide the phased array scanhead along the width of the phantom. Verify the following:

   a. No artifacts appear in the moving sector display (i.e., stationary, dark radial lines, which appear as rays from the top of the sector).

   b. The sector appears as a complete sector and not as two or more divisions (i.e., there should be no seams in the sector display).

2C–14.3 Curved and Linear Arrays

1. In 2D, set the controls as follows:

   - OUTPUT: Maximum
   - DYNAMIC RANGE: 40 dB
   - PROCESSING CURVE: 3
   - DYNAMIC CONTRAST ENHANCEMENT: E0
   - ZOOM: OFF

2. Cover the phantom surface with about 1/8 inch (3 mm) of water.

3. Position the scanhead on the phantom, and adjust 2D GAIN, TGC, and DEPTH as follows:

   a. Adjust the TGC controls for uniform grayscale echoes.

   b. Adjust DEPTH so that the top and bottom boundaries of solid scatter echoes are viewed within the image.

c. Adjust 2D GAIN for maximum or so that the far field noise does not interfere with the scatter echo recognition.

4. Set # FOCAL ZONES to 1.

5. Use the trackball to set the focal depth to the setting that gives the maximum observed penetration.

6. In paragraph 2C–14.1, perform steps 5 through 9 and verify that penetration corresponds to those shown in **Table 2C–7**.

Table 2C–7. Curved and Linear Array Penetration

Scanhead	Penetration (cm)
C3	12.0
C3.5	10.0
C5	6.6
C7–4	6.3
CIVT	5.5

C9–5	5.2
L5	6.3
L7–4	6.3
L10–5	4.8

2C–15 Internal Hardcopy Peripherals Tests

2C–15.1 VCR (VHS and SVHS)

1. Press the SETUP button, and then press VCR CONTROLS.

2. Insert a video cassette into the recorder. Verify that the recorder accepts the tape and loads it.

3. Press REWIND on the VCR FUNCTIONS panel to rewind the tape.

4. Press MIC ON/OFF on the VCR FUNCTIONS panel to turn on the microphone.

5. Press VCR RECORD L on the control panel and verify the following:

   a. The annotation RECORD is displayed on the interactive display.

   b. The RECORD button LED is brightly lit during the recording, and the active monitor LED is brightly lit during the recording.

6. In a normal tone of voice, speak toward the microphone (the microphone is located between the monitors).

7. Press STOP on the VCR FUNCTIONS panel.

8. Press REWIND on the VCR FUNCTIONS panel.

9. Allow the cassette tape to rewind to the point where the recording began. Press STOP on the VCR FUNCTIONS panel.

10. Press PLAY on the VCR FUNCTIONS panel, and verify the following:

    a. The recorded video is accurately displayed.

    b. The audio was accurately recorded.

    c. The volume control functions properly.

11. Press PAUSE on the VCR FUNCTIONS panel, and verify the following:

    a. Manipulating the trackball allows review of the recording in the forward (right) and reverse (left) directions, and controls speed.

    b. At each step, within the range of the variable speed review, an audible click is emitted from the UM-9 HDI control panel speaker.

c. As the trackball is moved to the right of Pause (identified by a tone), the review speed in the forward direction increases.

d. As the trackball is moved to the left of Pause (identified by a tone), the review speed in the backward direction increases.

e. The tape counter on the monitor tracks tape movement correctly.

12. Press PAUSE and verify the VCR is in PLAY.

13. Press FAST FORWARD on the VCR FUNCTIONS panel and verify the following:

    a. The frame counter tracks tape position.

    b. The VCR stops automatically at the end of the tape.

14. Press PLAY and verify that the error message END OF TAPE COMMAND NOT ALLOWED appears on the right monitor.

15. Press STOP. Rewind the tape.

16. Press EJECT and remove the video cassette from the VCR.

2C–15.2 Multi-Image Camera Tests

NOTE: This procedure covers both the Matrix and Aspect cameras.

1. Press SETUP, and then press HARDCOPY CONTROLS.

2. Prepare the camera for operation as follows:

    a. Insert a loaded film cassette.

    b. Remove the dark slide.

    c. Verify that the camera pulls the cassette into position (Matrix only).

d. Display the test sector on the right monitor.

e. Press STARTING LEVELS for the camera settings.

3. Press PRINT R on the UM-9 HDI control panel to select the right monitor.

4. Press SETTINGS AND STATUS. Use the trackball to select a group of brightness, contrast, and exposure settings. Use the gain controls to vary the levels of brightness, contrast, and exposure time (directions are displayed on the monitor).

5. Take the remaining prints of the Test Sector. Ensure that three of the remaining prints are taken in negative image, that the PRINT footswitch works properly, and that PRINT L button works properly.

6. Use the settings already established, or change them as desired. Press PRINT 6 FOR REVIEW, and verify the following:

   a. Six exposures are taken that correspond to the SETTINGS in the SETTINGS matrix.

   b. During each exposure the indicators for the selected monitor, FRZ, and PRINT are ON.

   c. The camera shutter makes a clicking sound (Matrix only).

   d. The cassette position motor runs every second exposure (Matrix only).

   e. After the last exposure, LAST FRAME EXPOSED is displayed on the monitor.

   f. Verify the cassette is ejected (Matrix only).

7. Develop the film, and verify the following:

   a. The graphics on the print are clear, legible, and accurately represented.

   b. The graybar test pattern and the TGC curve are accurately represented.

   c. Contrast and brightness variations between exposures.

   d. Absence of light leaks.

   e. Absence of speckles on the image (due to dirty optics).

   f. Absence of dark bands.

   g. Presence of 16 shades of gray in Test Sector images.

   h. Sector images are 90° ± 1° measured with a sector overlay (see paragraph 2C–1).

i. Sector image edges are not bowed more than 1.5 mm. (Scanlines on outside edge of the sector are not deflected more than 1.5 mm.)

j. The four sides of the prints do not display evidence of edge blanking.

8. If the exposures are not acceptable, insert another film cassette, change the brightness, contrast, and exposure settings, and take six more exposures. Take three exposures in standard video and three in negative image.

9. If the camera does not work properly, refer to the camera service manual.

2C–15.3 Aspect Multi-Image Camera Tests

1. Press SETUP, and then press HARDCOPY CONTROLS.

2C–15.4 Color Page Printer Tests

1. Perform the following steps to access the PRODUCTION-SERVICE TEST PANEL:

   a. Press the SETUP button on the front panel.

   b. Press the blank area next to CHANGE SETUPS four times to enter the PRODUCTION-SERVICE TEST PANEL.

2. Press VIDEO PR TEST and then press COLORBAR RGB.

3. Press the PRINT L button. Verify that the printer produces a color print.

4. Examine the print and verify the following:

a. A color test pattern appears on the print.

b. The colors are arranged as follows from left to right across the print white, yellow, light blue, green, violet, red, dark blue.

c. Each individual color appears vivid and uniform.

5. Get customer approval of print quality.

2C–15.5 Black and White Page Printer Tests

1. Obtain an RMI model 413 phantom image that displays depth pins, cysts, and axial resolution pins.

2. Press the PRINT R button to select the right monitor. Verify the following:

   a. The graybar is in sharp focus with contrast from light to dark with no streaking, smearing, or spurious lines.

b. Video information is spatially correct.

c. Structures are well-defined.

d. There is no information dropout.

3. Repeat steps 1 and 2 for a negative image.

4. Repeat steps 1 and 2 for the PRINT L button.

5. Get customer approval of print quality.

2C–16 External Hardcopy Peripheral Tests

2C–16.1 Rear Panel Ports Tests

1. Connect the external hardcopy device or the external VCR to the rear panel port being tested.

2. Press the SETUP button and then press HARDCOPY CONTROLS.

3. Press HARDCOPY DEVICES until the panel displays the name of the external hardcopy device that is connected to the rear panel port.

4. Verify that the external hardcopy device or the external VCR records the system video or audio. The external devices are controlled from the front panel of the hardcopy device and the control panel of the UM-9 HDI as follows:

   Print

   a. Press the PRINT R or L button on the system control panel.

   b. Press the PRINT control on the control panel of the hard-copy device.

   Record/Play

   a. Press one of the RECORD buttons on the system control panel.

b. Press the RECORD control on the control panel of the VCR.

c. Record a period of video and audio information.

d. Press Stop on the VCR.

e. Press Stop on the VCR CONTROLS panel.

f. Press Rewind on the VCR.

g. Press Play on the VCR CONTROLS panel.

h. Press Play on the VCR.

2C–16.2 External Polaroid Freeze Frame Camera

1. Press the SETUP button.

2. On the SETUP panel, press HARDCOPY CONTROLS.

3. On the HARDCOPY CONTROLS panel, press HARDCOPY DEVICES until the correct panel appears (i.e., EXTERNAL POLAROID FREEZE FRAME CAMERA).

4. On the EXTERNAL POLAROID FREEZE FRAME CAMERA panel press TEST PATTERN.

5. Ensure that there is film installed in the camera back.

6. Set the FILM SELECT switch on the camera control module to match the type of film that is installed.

7. Ensure that the dark slide is pulled out of the Autofilm back.

8. Set the controls on the camera control module for the normal settings:

Control	**Setting**
AUTOCOLOR	LED ON
FILL	LED OFF
PREVIEW	LED ON
COLOR	CENTER
TINT	CENTER
SHARPNESS	CENTER
CONTRAST	CENTER
BRIGHTNESS	CENTER

9. Press PRINT R or L on the system control panel and then press PRINT on the camera control module.

10. Verify that the PRINT LED on the control module blinks during the exposure.

11. Grasp the print by a corner and remove it from the slot. The camera back will automatically advance to the next frame after the exposure sequence.

12. Verify correct reproduction of the test image with respect to color, intensity, and hue.

13. Verify that the graphics and color bar are in sharp focus and the color bar displays the full range of colors that are displayed on the monitor.

2C–17 Miscellaneous Tests

2C–17.1 Microphone and Audio Dub

1. Select a video tape with previously-recorded Doppler audio.

2. Stop the tape over some previously-recorded audio (Doppler on both channels is preferred).

3. Press AUDIO DUB on the VCR FUNCTIONS panel. Verify the following:

    a. The video tape begins to play.

    b. There is no audio.

    c. The left monitor LED is lit.

    d. The microphone LED is lit.

    e. The VCR status display on the touch panel reads DUB.

4. Speak into the microphone to record new audio.

5. Verify that the new audio is recorded over the old audio on the right speaker channel.

6. Verify that the Doppler on the left speaker has not been degraded.

7. Listen to the headphones, and verify that the microphone audio is played back on the right side and Doppler is played back on the left side.

2C–17.2 Speakers

1. Record some Doppler information with the microphone turned off.

2. Play back the recording with the audio volume set to 12 o’clock, and verify the following:

   a. There is no distortion.

   b. The volume control operates correctly.

   c. Flow toward the scanhead is represented on the left speaker and flow away from the scanhead on the right speaker.

d. Headphone audio presents flow toward the scanhead in left headphone and flow away from the scanhead in the right headphone.

e. There is no crosstalk between the speakers and the headphones.

2C–18 Performance Test Checklist

Initialization . . . . j

Setup Parameters . . . . j

Control Panel Test . . . . j

    Keyboard . . . . j

    Interactive display . . . . j

    Dedicated pushbuttons . . . . j

    Footswitches . . . . j

    Trackball . . . . j

2D Preventive Maintenance

2D–1 Introduction

The Preventive Maintenance process addresses not only the system requirements, but serves as an official semi-annual audit of our customer. The procedures outlined here are meant to be guidelines and should not replace common sense. Each system has unique preventive maintenance needs depending on the operators, the usage, and the type of environment the system is operated in. Address and resolve any issues that customers feel are relevant to their relationship with ATL.

NOTE: Some parts of this section include policies, equipment requirements, and procedures that may apply only to U.S. field use. For dealers, affiliates, or other authorized service personnel who do not use the domestic U.S. service documents, use your equivalent document, where applicable.

The checklist included at the end of this section can be used to ensure that all maintenance procedures are performed.

Abbreviations Used

PM = Preventive Maintenance

FSR – Field Service Report

2D–2 Equipment and Materials Required

The following items are recommended for a CSR PM kit. Develop a method for carrying and maintaining adequate levels of each item. Add other items as necessary.

- Equipment
  - Anti-static mat
  - CSR tool kit
  - Phantom
  - Oscilloscope
  - Multi-meter
  - Vacuum cleaner
  - Three-prong test plug
  - ONEAC Line viewer
- Materials
  - PM Parts (see Table 2D–1)

2D–3 Reference Documentation

Refer to these documents, as necessary.

- B&W Printer Field Service Manual (4720-0220-XX)
- Color Printers Field Service Manual (4720-0221-XX)
- Camera Field Service Manual (4720-0222-XX)
- VCR Field Service Manual (4720-0223-XX)
- General Service Manual (4720-0219-XX)
- PM FSR Form (198-19055-00)

Table 2D–1. Preventive Maintenance Parts

Part Description	Part Number
General Supplies	
Paper Towels	local
Glass Cleaner, Fantastic, 409, etc.	local
Alcohol Wipes	local
Acetone Wipes	local

Part Description	Part Number
Freon	2301-0546-01
Copper tape	9901-0025-01
Latex gloves	6320-0004-01
15A Hubble plug	3100-0714
Fiberglass brush	6320-0001-01
BNC T connector	3100-0800
RCA to BNC connector	3100-1845-01
BNC barrel connector	3100-0799
75 ohm terminator	3100-1062
6ft. BNC cable	2275-0176
18in. BNC cable	101-20769-36
Clean filter labels	4100-0355
Access fill kits	130-27009-07
WAA fill kits	8000-0467-01
Yellow Eureka bags	6005-0244-01
Brown Eureka bags	6005-0244-01

Part Description	Part Number
PM field service reports	4765-0373-01
PM stickers	4100-0940-01
PM certificate	198-19058-00
Nylon PM bag	6005-0593-01
Cable Management Supplies	
Velcro +	2210-0125
Velcro –	2210-0126
Velcro (white)	9901-0035
Plastic J hooks	2950-0464-01
Cable ties (small)	2208-0003
Cable ties (medium)	2208-0058
Cable ties (large)	2208-0061
Cable labels	2209-0048
Cable tie blocks	2208-0002
Cable anchors	2208-0070
Cable clamp 1 in.	2208-0116

Part Description	Part Number
Cable clamp 2 in.	2208-0063
Cable strap #8	2208-0073
Cable strap #6	2208-0105
Scanhead clip holder (sm)	6005-0461-01
Scanhead clip holder (med)	6005-0461-02
Nylon mesh cable wrap	2210-0191
Adhesives, Paints, and Lubricants	
Tak Pak	2301-0244
Super glue	2301-0264
Super gel	2301-0503-01
Adhesive pack	2301-0194
Loctite™	2301-0258
Epoxy silicone sealant	2301-0145
Thermal repair	2301-0369
Blue Loctite™	2301-0256
Ivory paint #1	199-19015-02

Part Description	Part Number
Black paint	199-19016-03
Ivory spray paint	2301-0552-01
White paint	199-19015-01
Tri-Flow lubricant	2301-0565-01
White grease	198-18411-00
General purpose lubricant	198-12226-00
Peripheral Parts and Supplies	
Sony cleaning sheets	2100-0506-01
Mitsubishi cleaning sheets	2100-0519-01
Lens paper	2100-0283
Lens cleaning fluid	2301-0344
Lens static brush	2100-0277
Matrix servo pot	198-16200-00
Matrix dark slide switch	198-16239-00
Matrix cassette switch	198-16238-00
Lenzar lithium battery	6009-0056-01

Part Description	Part Number
Lenzar fan shield	6014-0018-01
Sony 811 thermal head	6005-0137-01
Sony 850 thermal head	6029-0009-01
Sony 811 door	6005-0111-01
Sony 850 door	6029-0049-01
Ferrite pot core	2604-0041-01
UM9 HDI Replacement Parts and Supplies	
Keyboard ground strap	1065-1818-02
Patient cable (ECG)	199-12201-00
ECG leads	199-12200-00
Slidepots	3200-0196-01
Monitor brightness pot (B/W)	6005-0055-01
Monitor contrast pot (B/W)	6005-0056-01
Monitor brightness pot (color)	3500-0779-02
Monitor contrast pot (color)	3500-0780-02
Gel holder insert	118-26393-02

Part Description	Part Number
Keyboard latch kit	6220-0072-01
Rail end caps	1064-0494-01
HDI data save recall disk	4252-0550-02
Control Panel button kit	1065-0813-02

2D–4 Scheduling

On a semi-annual basis, you will receive a list of PMs to be performed. The schedule is a convenient means for targeting and tracking PM compliance.

1. Schedule the PM appointment well in advance so that the customer will allow sufficient time for its completion. Discuss system problems at this time so that you are prepared to address and resolve them during the PM appointment.

2. Speak with all available system users about any concerns that they have about ATL or our products. This information should be logged on the PM FSR for appropriate action. Notify the regional/sales manager if the situation dictates.

3. Communicate issues to the appropriate company representative.

4. Order any needed parts in time for the PM inspection.

2D–5 Procedure

For every PM procedure, perform each section included here (paragraphs 2D–5.1 through 2D–5.12).

2D–5.1 System Performance Issues

1. Inquire about system performance since the last service call. Document system performance issues on the PM FSR.
2. Request hardcopy or VCR images that demonstrate reported problems.
3. Examine past FSR activity located in the Customer Information Directory or your own files. Help your customer set up and maintain a system performance file if one does not presently exist.
4. If the reported system problem is a known engineering issue, advise the operator and submit a customer complaint report if the issue is serious to them.

NOTE: Customer complaints, when used appropriately, can help Engineering prioritize a fix and will ensure that if a correction is implemented, your customer will receive it. Before submitting a customer complaint, verify that the problem is not already known (as documented in operating notes, hot tips, and service bulletins).

5. Question the operators about environmental conditions including ventilation, electrical power, ESD, and airborne particulates.

2D–5.2 Environmental Verification

Use the system specifications included in Section 2A for reference. Record measurements and observations on the PM FSR for future reference.

Electrical Power Verification

1. Verify that the system and its external peripherals are all connected to the same circuit. This ensures a single point grounding reference.

2. Inspect the outlet for signs of physical damage and ensure that it maintains good contact with a plug.

3. Verify proper outlet wiring and grounding with a three-wire outlet tester.

4. Verify that the AC line voltage is within the specified tolerance with the load applied. There must be less than 3 VAC (RMS) measured between neutral and ground with full load.

5. Verify that waveform distortion, common mode noise, and normal mode noise are within the specifications included in the General Service Manual.

6. If a wiring fault has been discovered, advise the customer immediately to have it corrected as soon as possible.

7. Affix a Power Line Data sticker next to the qualified outlets in the primary operational areas. Advise the customer to use only the qualified outlet for the system and its associated peripherals.

Electrostatic Discharge

1. Ask the system operators about their experiences with static discharge.

2. Verify the presence of ESD, if possible.

3. Discuss preventive measures, including static mats, sprays, and humidifiers.

Radio Frequency Interference

Note any potential RF generators that can inject noise into the system. Typical generating devices may include gel warmers, coffee pots, air conditioners, fans, computers, lab equipment, surgical equipment, treadmills, and EKG machines.

Ventilation

1. Evaluate the heat and humidity in the operation site.

2. If the room seems to be out of the normal operating limits, tell the operator and advise the facilities staff about the cooling/ventilation requirements of the system.

Dust

Customers who use linen will frequently have a dust problem. Advise them to periodically clean the air filter.

1. Inspect all air filters for excessive dust accumulation.

2. Clean air filters as necessary.

3. Recommend a portable vacuum cleaner to customers who have a problem with excessive dust.

2D–5.3 Problem Identification and Correction

1. Before disassembling the system, verify all problems reported by the customer.

2. Perform a brief operational inspection in all modes to identify and document any additional system deficiencies.

3. Review the customer's default settings for each medical specialty. If there is no hardcopy record, photograph or otherwise document them for future reference.

4. Make a back-up CMOS default disk to be left with the system. Be sure to include OB Calcs, color maps, and camera settings.

5. Review the system error logger for indications of intermittent problems.

NOTE: There are also standard errors that occur during boot-up. If they are abnormal they can provide clues to system problems, particularly initialization errors.

6. Clear the error logger.

7. Review system checksums and verify them against the Configuration Section.

8. Troubleshoot all identified technical faults and correct them at this time if possible. If parts are needed to complete repairs, list them on the PM FSR. (You will order these at the completion of the PM inspection.)

9. If the system has intermittent or reliability problems, verify the PCB and PROM dash levels and the jumper/switch settings.

2D–5.4 Mechanical and Electrical Integrity

1. Verify the proper operation of the casters and locking mechanisms. Ensure that the retaining bolt is secure. Apply Loctite if necessary.

2. Verify that the OEM access door operates freely and locks properly.

3. Remove all system covers, shields, and retainers.

4. Verify no objects are restricting air flow through vents.

5. Inspect and clean the screen above the cardcage to allow for proper air flow.

6. Disassemble the power plug and check for loose connections.

7. If the system has the scanhead management system, remove the racks and lubricate the swivel mechanism with Tri-Flow.

8. Verify the proper operation of the monitor swivel mount.

9. Inspect the system for signs of physical stress. This is particularly important if the account uses the system in a mobile environment. Ensure that both PCB retainers are present.

10. If you observe signs of physical stress, reseat all PCBs and ICs using anti-static procedures.

11. Inspect all cable assemblies for signs of wear and verify the integrity of their connections.

NOTE: Pay particular attention to the cables between the control panel and the motherboard, which are easily damaged by the keyboard rails.

12. Unplug the system from the wall and inspect the cabling and connections within the power supply area. Check for any discoloration at the connections including the lugs on the power switch (3100-0301).

13. Tighten loose connections in the terminal blocks and on the power supplies themselves.

14. Examine the power cable at the bulkhead connection for signs of wear, strain, or discoloration. Ensure adequate strain relief.

15. Inspect the external OEM cables for wear and verify that the ferrite cores are intact.

16. Power-up the system and verify that all fans are turning by looking between the PCBs with a flashlight or by examining the air filter for a lack of dust in one location.

17. Inspect the grill filter behind the air filter for clogging.

18. Using a brush and solvent, clean the contacts on all linear/ annular scanhead connectors and the corresponding system connectors.

2D–5.5 Common Problems and Retrofit Issues

1. Review Service Bulletins and Hot Tips for information relevant to known system problems and solutions. (Service Bulletin Info–61 and the New Technical Documentation memo are published regularly as listings of active Service Bulletins.)

2. Verify that the keyboard rolls smoothly. If necessary, tighten or replace keyboard rail screws.

3. Verify that the keyboard latch functions properly. If necessary, lubricate the latch with Tri-Flow.

4. Inspect the keyboard ground strap and replace it if required.

5. Replace any excessively worn control panel keys.

2D–5.6 Alignments

1. In Section 3 of this manual, find the location and specifications of all system power supplies.

2. Using your digital multimeter and oscilloscope, verify the voltage level of all system power supplies (discrete, digital, pulser, and monitor) against those specifications.

NOTE: If the system is experiencing noise or reliability problems, be sure to verify AC ripple specifications.

3. Examine both of the video monitors in all modes, verifying vertical/horizontal size and position, focus, linearity, brightness, and contrast.

4. Examine the color monitor for gray background.

5. Test the brightness and contrast controls and replace them if noisy.

6. Verify monitor stability during VCR playback, especially in slow mode.

2D–5.7 Peripherals

VCRs

1. Clean external surfaces.

2. Verify all switch settings.

3. Inspect external cable assemblies.

4. Listen for signs of mechanical problems.

5. Verify record/playback quality in all modes. Be sure to include Doppler and microphone audio as well as audio dub.

6. If playback quality is poor, clean the tape path.

NOTE: ATL Service Shop personnel recommend against cleaning the internal tape path on portable VCRs.

7. Verify proper frame grabber operation during the system test, if applicable.

Matrix 1010 Multi-Image Camera

1. Clean and inspect the external covers and the air filter.

2. Verify the integrity of the interconnect cable assembly and the power cable.

3. Remove the covers to gain access to all internal assemblies.

4. Perform an internal cleaning and inspection. Verify the integrity of cables (especially the cassette/dark slide detect switch cables), PCBs, and socket-mounted devices.

5. Using lens cleaner (no alcohol) and tissues, clean the mirrors, the lenses, and the CRT face.

6. Verify proper operation of the cassette and dark slide detect switches.

7. Verify the security of the view-port door.

8. Lubricate cassette rails with Tri-Flow if they are dry.

9. Inspect the integrity of the window shade and its attachment to the cassette mechanism.

10. Check for excessive play in the cassette mechanism and adjust it if required. If you are unable to adjust the cassette driver circuitry, look for a defective servo pot.

11. Verify that the copper tabs hold the film cassette securely and that they do not interfere with insertion.

12. Verify that the cassette finds its proper position without searching or chattering.

13. Verify that the voltage levels are within specification on the +5, +15, –15 and +26 volt power supplies.

14. Replace the battery if the voltage reads less than 3.2V with the power off.

15. Verify the charging voltage of 5.0V at pin 9 (gnd) and pin 18 on U 35 or U 36 on the Main PCB.

16. Verify that the camera video is properly terminated and that the rear panel switches are properly set.

17. Photograph all system modes and verify proper video alignment. Listen for signs of mechanical problems.

18. Inspect the customer’s film cassettes for physical soundness.

19. Review the MIC images with the operators for their approval.

20. If the operator has expressed a concern over camera drift, use the following procedure to isolate the problem at the camera, the film, or the processor.

    a. After the images have been aligned to user preference take two exposures. Do not develop the film.

    b. Put the cassette away where it won’t be used.

    c. After the user reports a camera drift, verify the original settings and reinsert the cassette into the camera.

    d. Advance past the first two exposures.

    e. Expose positions three and four.

    f. Develop the film. If the camera has drifted, positions 1 and 2 will be different from 3 and 4. If the problem is in either the film or the processor, all exposures will be the same.

B/W Printers

1. Clean and inspect the external covers.

2. Verify the integrity of the interconnect cable assembly and power cable.

3. Verify the physical integrity and operation of all doors, buttons, and knobs.

4. Verify switch settings.

5. Verify print quality. If there are lines in the print, attempt to clean the print head with the appropriate head cleaning sheet moistened with alcohol. If lines persist, try cleaning the print head with an eraser.

6. Print all system modes and verify proper printer alignment. Listen for signs of mechanical problems during printing.

7. Review the printer images with the operators for their approval.

8. Verify that the system operators have a head cleaning sheet and know how to use it. Provide them with a sheet, if necessary, and give them information on ordering additional sheets.

Color Printers

1. Clean and inspect external covers.

2. Verify the integrity of the interconnect cable assembly and power cable.

3. Verify the physical integrity and operation of all doors, paper trays, buttons, and knobs.

4. Verify switch settings.

5. Verify the alignment of the print on the film and adjust if required with the appropriate procedure in the peripheral service manual.

6. Print all system modes and verify proper printer image quality. Listen for signs of mechanical problems during printing. If the images are streaky, clean the rollers with alcohol.

7. Review the printer images with the operators for their approval.

8. Verify the physical integrity and operation of all doors, paper trays, buttons, and knobs.

2D–5.8 Scanheads

1. Clean transducer and cable with an approved disinfectant (see “Using Disinfectants and Gels”, P/N 4700-0249-XX). Avoid using alcohol or lanolin-based products as they can soften the transducer cap.

2. Inspect cables and transducer housing for signs of physical damage.

3. Check for air bubbles (A6-3 only).

4. Verify smooth operation of the locking mechanism on beam-former transducers and tighten it if it is loose.

5. Listen for signs of mechanical problems in oscillating transducers.

NOTE: You will verify scanhead performance during the performance tests in Section 2C.

2D–5.9 Re-assembly

1. Examine the air filter to verify that the operator is cleaning it and orienting it in the system properly.

2. Connect the scanheads and footswitches.

3. Power-up the system and perform a quick functional verification prior to its re-assembly.

4. Reconnect all external OEM devices.

5. Reassemble the entire system including PCB retainers, shields, and covers. Verify that all hardware is present.

6. Clean all external surfaces with a non-abrasive cleaner such as glass cleaner. Pay particular attention to frequently used keys and controls.

CAUTION

Avoid using alcohol on monitor bezels, transducer caps, and the touch panel.

7. Touch-up scratches with paint if it will enhance system appearance. Note heavily damaged panels that should be replaced.

8. Repair or replace loose or missing scanhead and gel holder inserts.

2D–5.10 Exterior Clean-up

1. Correct visible flaws with touch-up paint or parts replacement. If the damage is considerable, replace the item rather than using excessive amounts of touch-up paint.

2. Replace all missing hardware

3. Clean all exterior surfaces.

2D–5.11 Functional Verification

1. Verify that all medical specialty defaults are intact and that the date/time and institution name have been retained.

2. Verify system performance by performing all tests in Section 2C, "Performance Tests."

2D–5.12 PM Closure and Follow-up

1. If parts are needed to complete your service activities, order them before leaving the account.

2. Place a PM sticker on the system.

3. Complete the PM FSR and review all reported issues and actions with your customer.

4. Commit to follow-up on those issues raised earlier that could not be addressed on-site or that require action by another individual or department.

5. Present the customer copy of the PM FSR to the customer.

6. Place all applicable service documentation into the Customer Information Directory. Documentation might include a copy of the PM FSR, system defaults, and consumables price list.

7. Enter a reminder in your day planner to make a follow-up phone call one week after completion of the PM to ensure all other commitments have been kept.

8. Discuss Extended Warranty programs.

9. Thank the customer.

2D–6 Preventive Maintenance Checklist

System Performance Issues . . . . j

Environmental Verification . . . . j

Electrical Power Verification . . . . j

Electrostatic Discharge . . . . j

Radio Frequency Interference . . . . j

Ventilation . . . . j

Dust . . . . j

Problem Identification and Correction . . . . j

Mechanical and Electrical Integrity . . . . j

Common Problems and Retrofit Issues . . . . j

Alignments . . . . j

Peripherals . . . . j

VCRs . . . . j

3 Adjustments

3–1 Materials and Equipment

DVM

Oscilloscope

Monitor Overlay (P/N 4100-0890-01)

Nonconductive common screwdriver

3–2 Power Supply Adjustments

WARNING

Dangerous voltages are present within the system when power is applied. Disconnect the system from the AC mains during disassembly.

WARNING

Following system disassembly, verify that unauthorized personnel are clear of the system before applying power.

WARNING

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is nearby.

CAUTION

Power supply adjustment test points for systems with the 7500-0588 motherboard are located in different slot locations than test points on systems with the 7500-0677 motherboard. Refer to Section 5A for the PCB locations and Table 3–1 for the test point locations when checking voltages.

NOTE: ESP systems contain the 7500-0677 motherboard with some of the PCBs in different slot locations than systems originally released with the 7500-0677 motherboard. However, slot locations of the PCBs with the power supply test points did not change.

Adjust the power supply in accordance with **Table 3–1** and **Figure 3–1** through **Figure 3–9**.

Table 3–1. Power Supply Adjustments

Meter Adj.	Connections	Voltage	Reference	Notes
+5.0V Digital Power Supply	CPU TP1 CPU DGND TP7 or IFOM TP1 CPU DGND TP7 or P2 Pin 27 of Scan-head Select PCB	+5.00V (±0.20V)	Figure 3–1 Figure 3–2 Figure 3–3 Figure 3–4 or Figure 3–9	Adjust CH1 V ADJ

+12V Digital Power Supply	CPU TP5 CPU DGND TP7	+12.00V (±0.40V)	Figure 3–1 Figure 3–2 Figure 3–3 Figure 3–4	Adjust CH3 V ADJ
–12V Digital Power Supply	CPU TP6 CPU DGND TP7	–12.00V (±0.40V)	Figure 3–1 Figure 3–2 Figure 3–3 Figure 3–4	Adjust CH2 V ADJ
–5.2V Sense Digital Power Supply	CPU TP4 CPU DGND TP7	–5.25V (±0.05)	Figure 3–1 Figure 3–2	Adjust CH4 V ADJ
–15V	–V on Power Supply pin 5A (–15V), pin 6A (GND) connector P1 GND terminal on XFRMR ASSY or P2 Pin 32 of Scan-head Select PCB	–15V (±0.50V)	Figure 3–5 or Figure 3–9	Adjust V ADJ

Meter Adj.	Connections	Voltage	Reference	Notes
+15V	+V on Power Supply pin 5A (–15V), pin 6A (GND) connector P1 GND terminal on XFRMR ASSY or P2 Pin 30 of Scan-head Select PCB	+15.00V (±0.50)	Figure 3–5 or Figure 3–9	Adjust VR2
–6V	On Power Supply	–6.00V (±0.20V)	Figure 3–5	Adjust VR2
+6V	On Power Supply	+6.00V (±0.20)		Adjust VR2
+48V Pulser Power Supply	+V on Power Supply, GND terminal on XFMR ASSY	+48V (+1.6V)	Figure 3–6	Adjust V ADJ
+20.00V Video Monitor Power Supply	"+" and "–" terminals VM power supply (connect power supply to monitor)	+20.00V (±0.50V)	Figure 3–7	Adjust V ADJ
+16.5V	Motor Controller TP20	+16.5V (±0.20V)	Figure 3–5	

Meter Adj.	Connections	Voltage	Reference	Notes
–16.5V	Motor Controller TP23 Motor Controller TP1	–16.5V (±0.20V) GND	Figure 3–5	
0 to +105V	L10 on Scanhead Select PCB, GND terminal on XFRMR ASSY	Variable from 0 to +105V	Figure 3–9	Non-adjustable. Voltage depends on scanhead depth, etc.
0 to –105V	L12 on Scanhead Select PCB, GND terminal on XFRMR ASSY	Variable from 0 to –105V	Figure 3–9	Non-adjustable. Voltage depends on scanhead depth, etc.

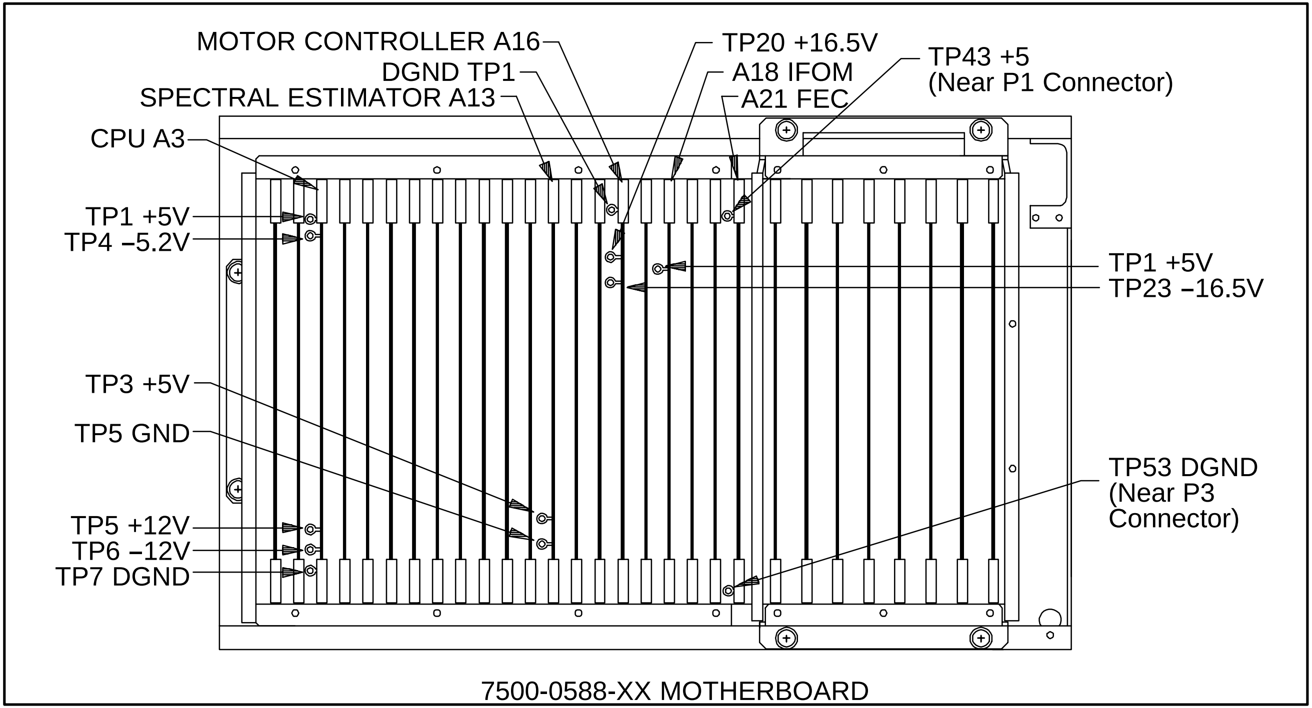


Figure 3–1. Card Cage Voltage Measurement Locations (1 of 2)

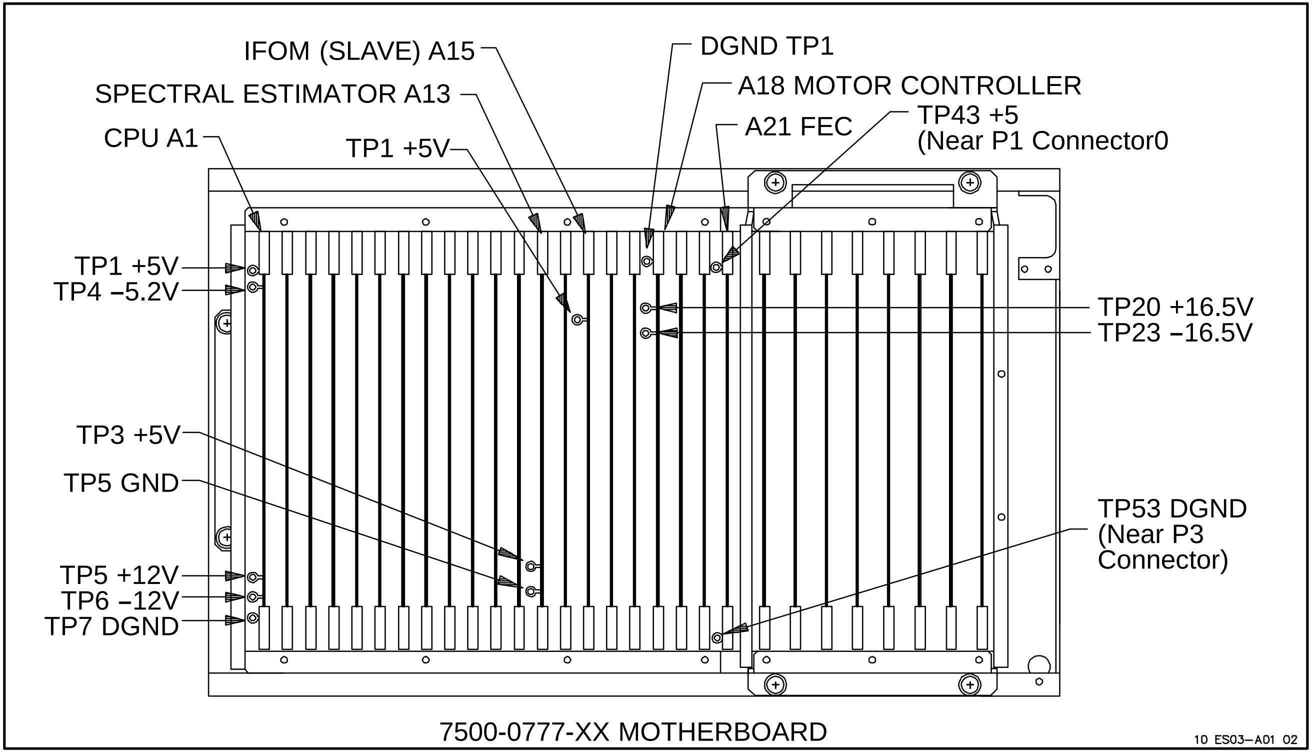


Figure 3–2. Card Cage Voltage Measurement Locations (2 of 2)

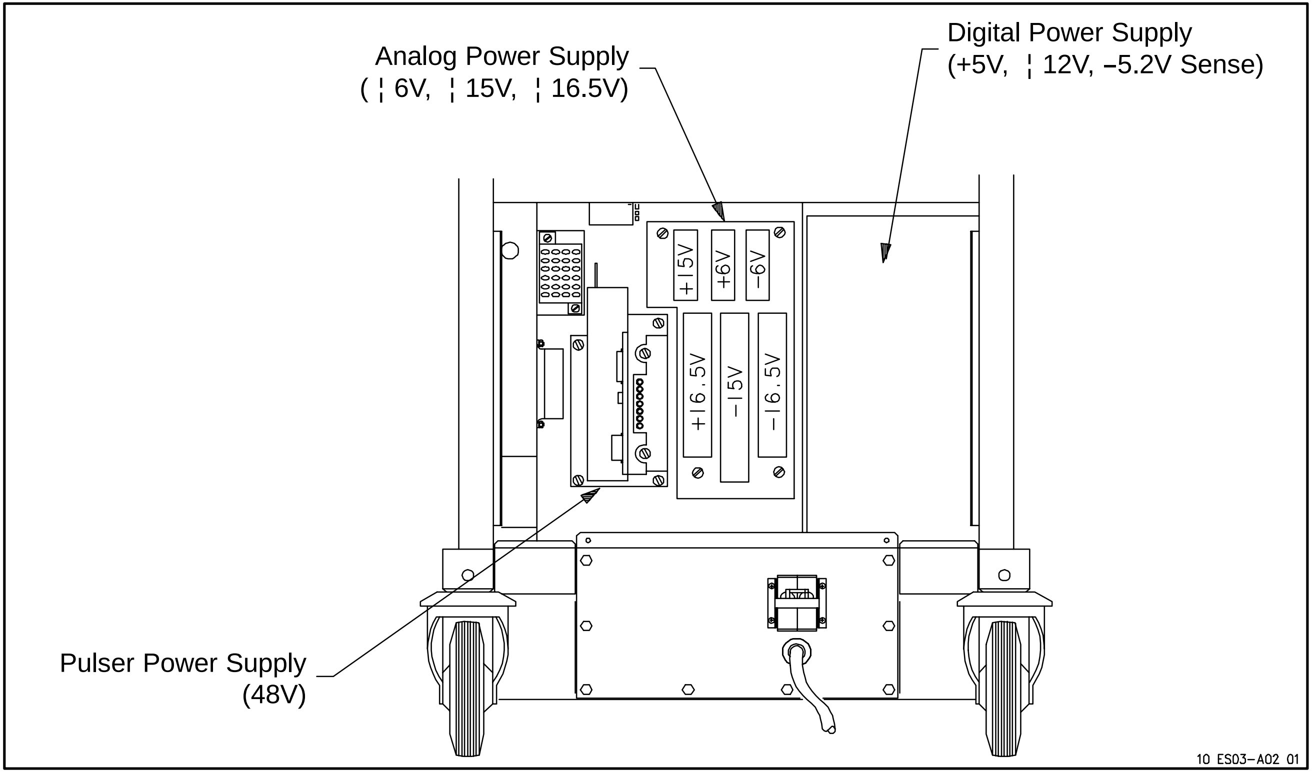


Figure 3–3. Power Supply Locations

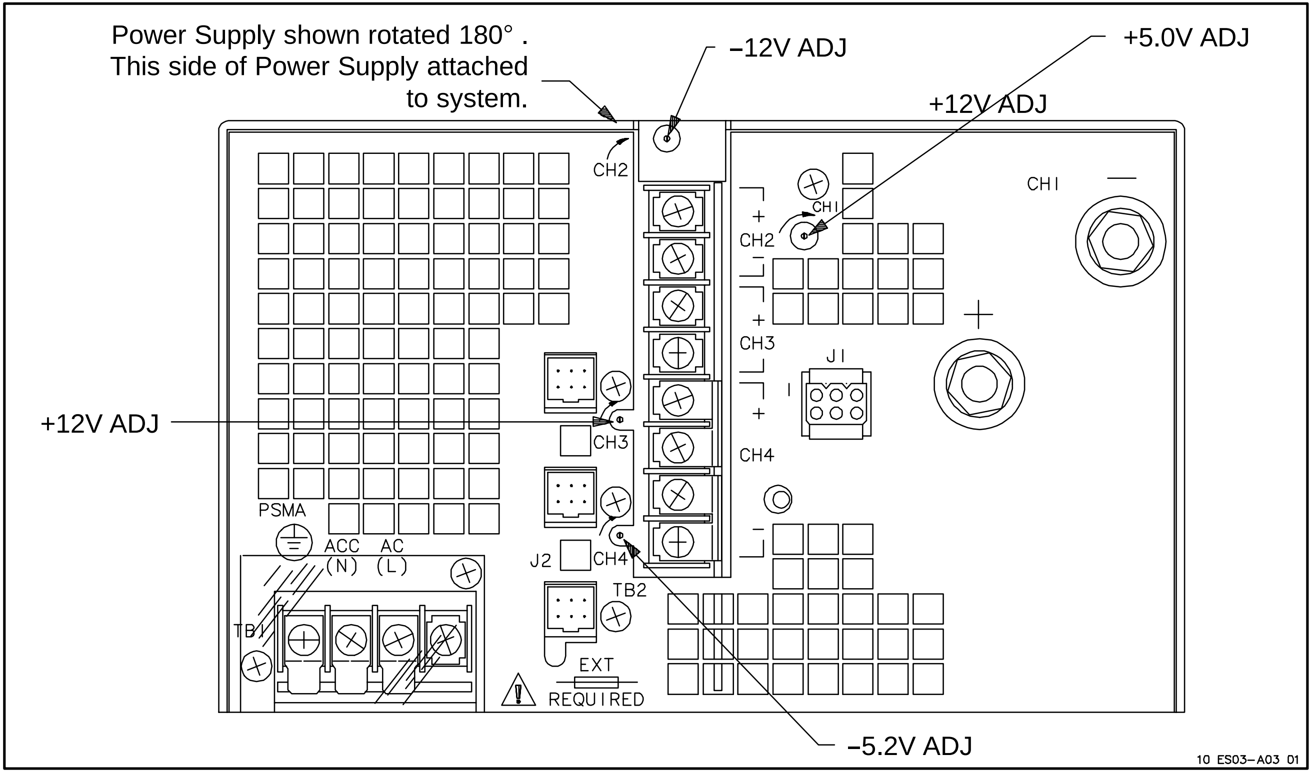


Figure 3–4. Digital Power Supply Voltage Adj. Locations

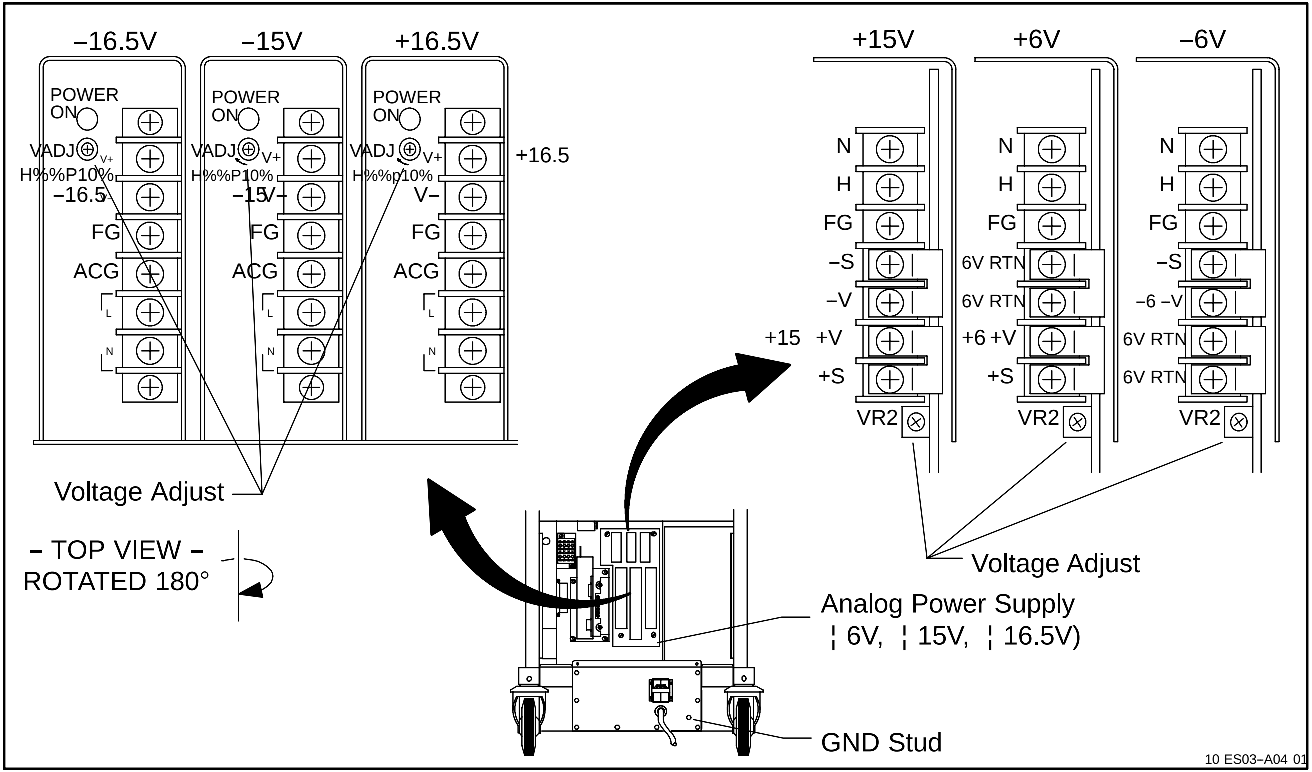


Figure 3–5. Analog Power Supply Voltage Adj. Locations

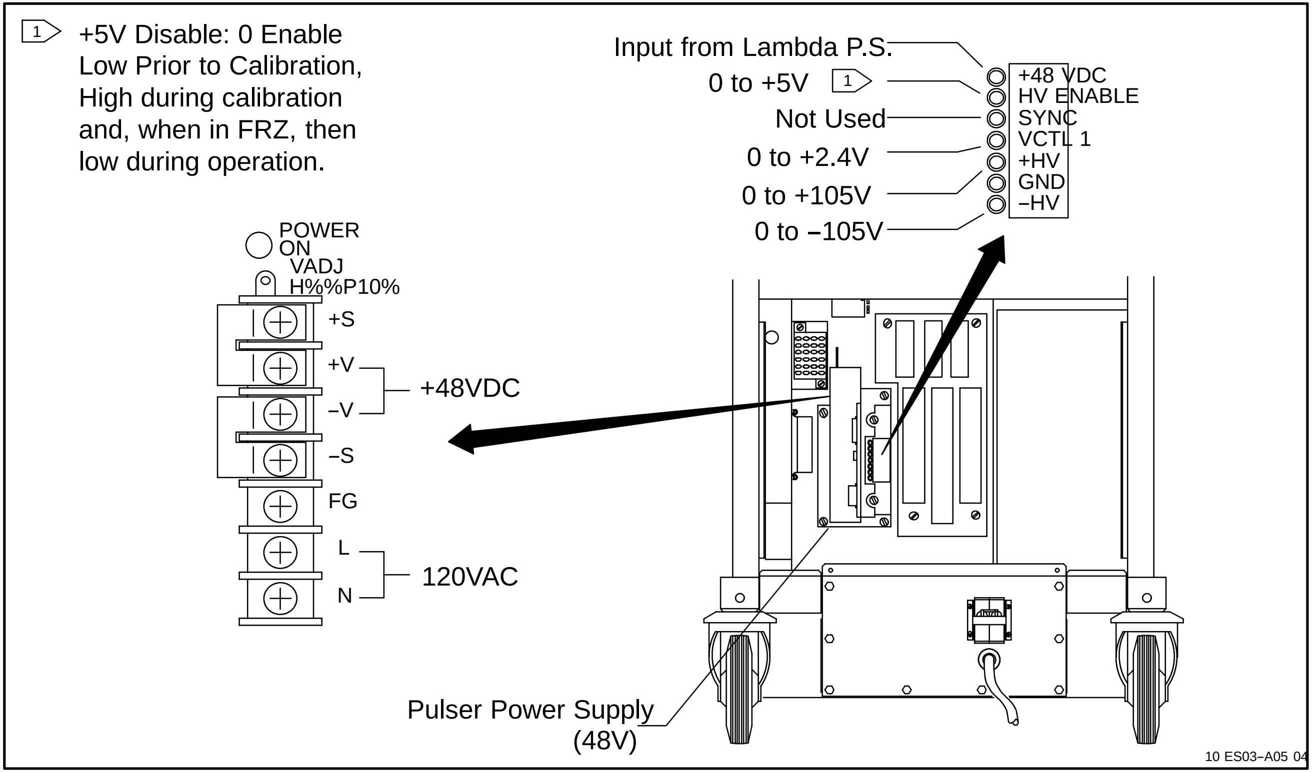


Figure 3–6. Pulser Power Supply Test Points

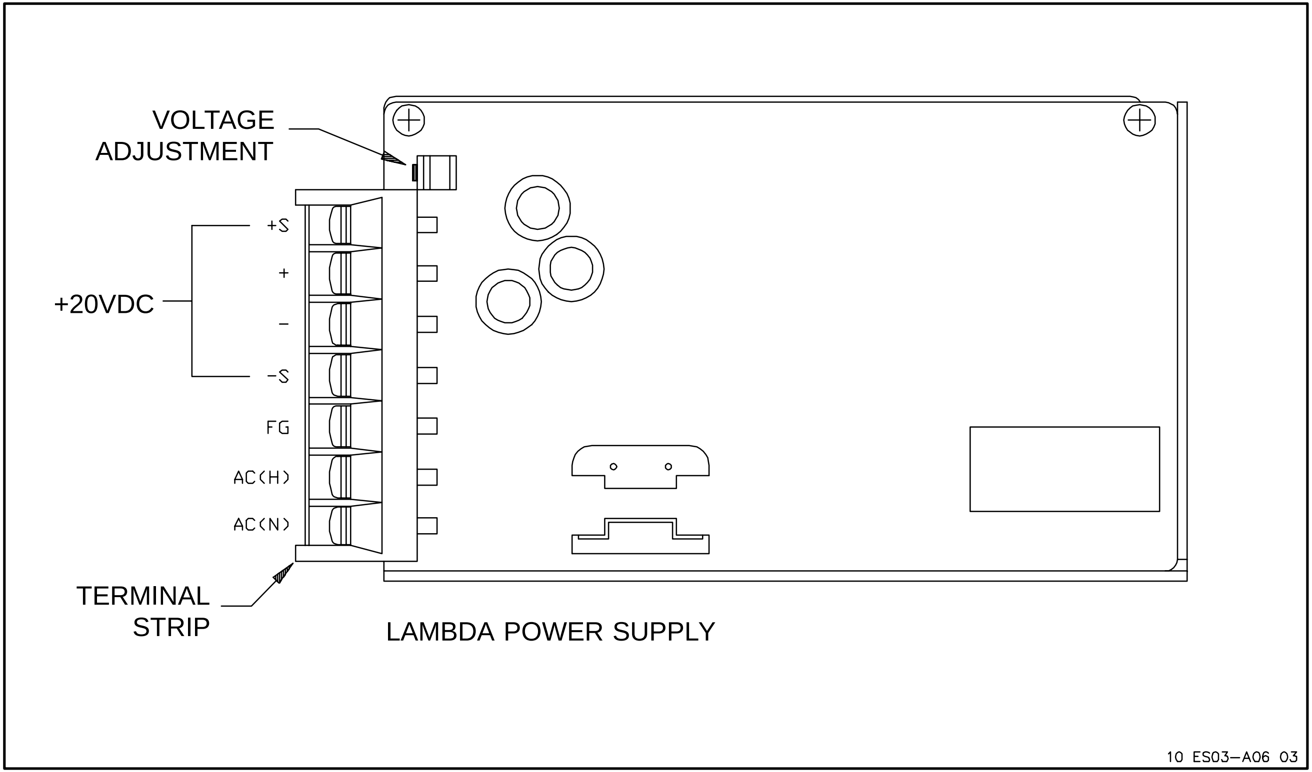


Figure 3–7. Video Monitor Power Supply

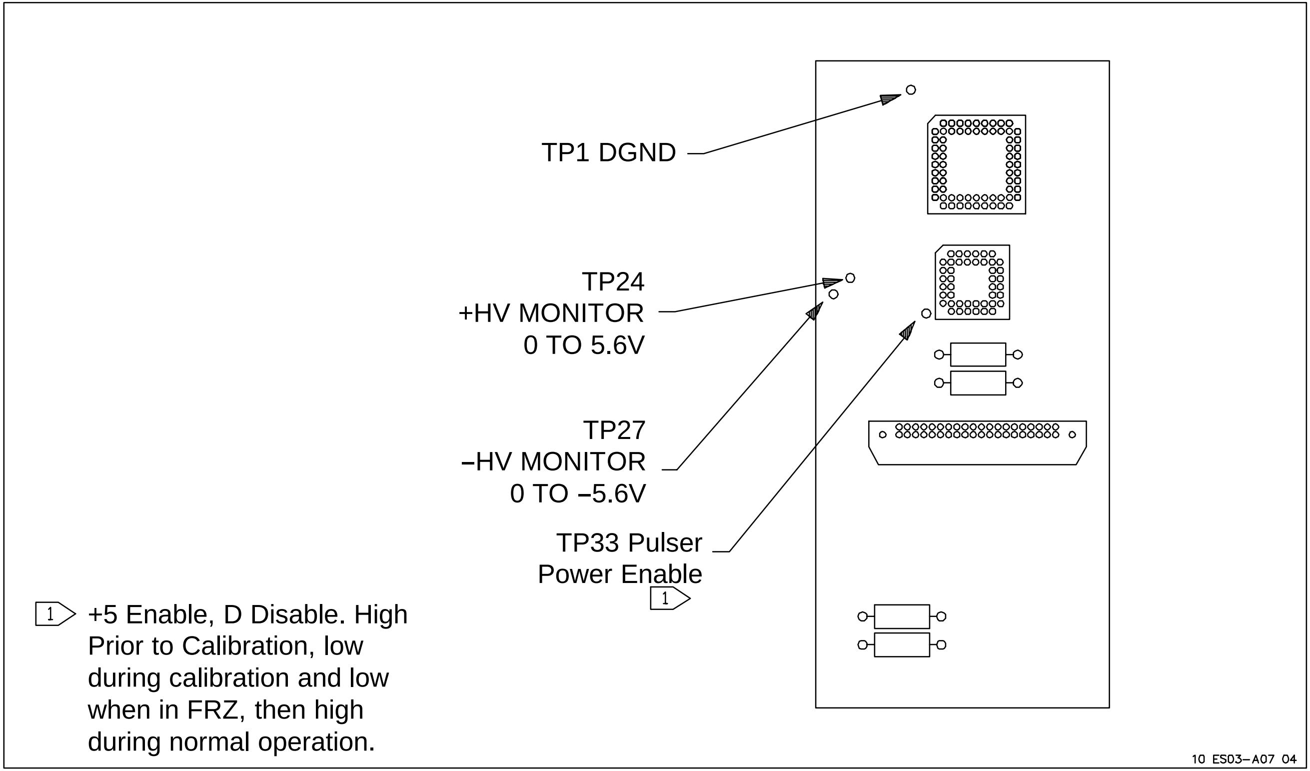


Figure 3–8. Scanhead Select Daughterboard Test Points

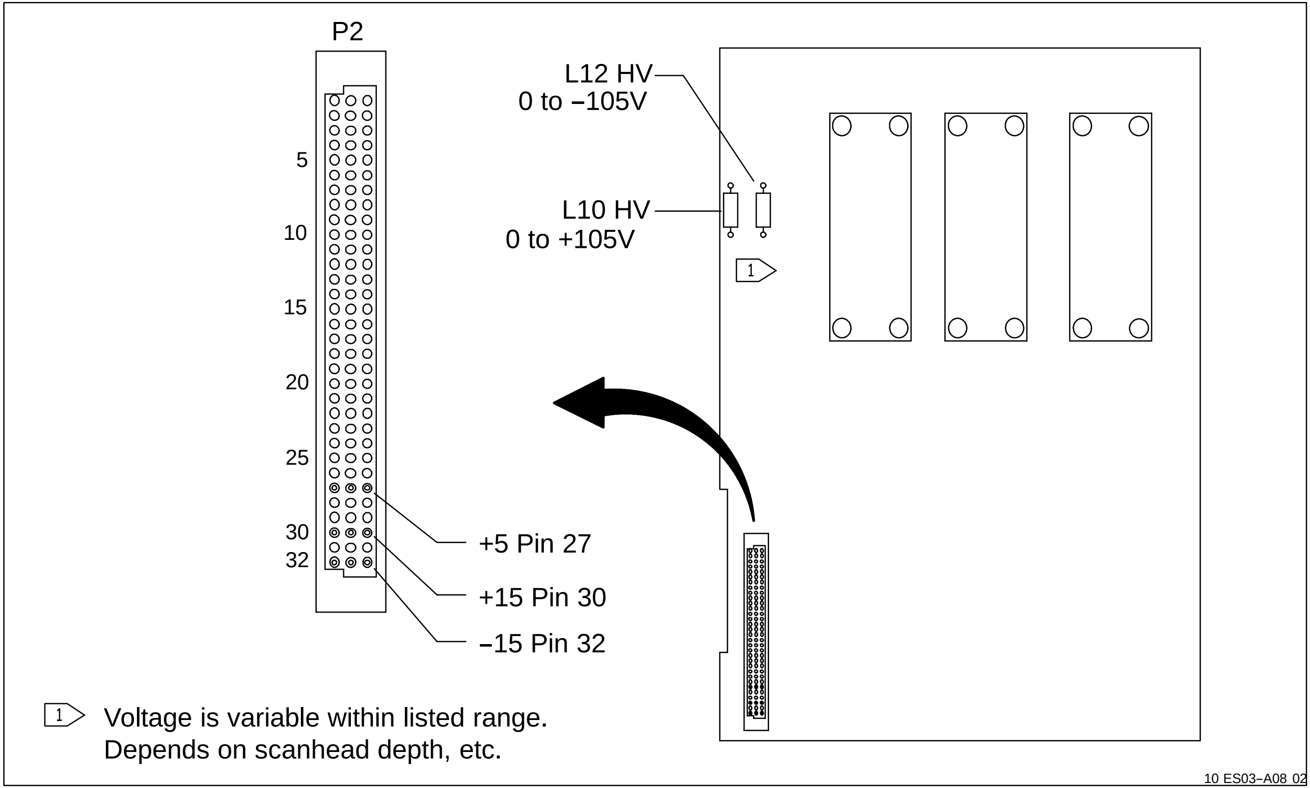


Figure 3–9. Scanhead Select PCB

3–3 Monitor Adjustments

3–3.1 Monochrome Monitor

Refer to **Table 3–2**, **Figure 3–10** and **Figure 3–11** for the monochrome monitor adjustments and adjustment locations. Use the Production Service Panel to display the appropriate test pattern prior to making adjustments.

Table 3–2. Monochrome Monitor Adjustments (P/N 3500-1433)

Adjustment	Location	Reference	Requirement	Notes
Horiz. Osc.	R27	Figure 3–10 Figure 3–11	Adjust so horiz sync bar is vertical	Jumper U4 pin 14 to GND
Vert. Osc.	R119	Figure 3–10 Figure 3–11	Adjust for 17.5 millisecond waveform	1. Jumper U4 pin 14 to GND, 2. Set Oscilloscope to 5 ms, 0.5 V/div, and 3. Connect probe to yellow wire on yoke
Horiz Linearity	L2	Figure 3–10	L2 CW for min. raster width	L2 CCW for optimum horiz linearity. Use cross hatch pattern
Width	L1	Figure 3–10	Adjust so unblanked raster just fills screen	Center with centering rings
Horiz. Phasing	R33	Figure 3–10	Center raster horizontally	

Adjustment	Location	Reference	Requirement	Notes
Height	R120	Figure 3–10 Figure 3–11	90.0 degree sector	Use 2D sector and monitor overlay (P/N 4100-0890-01)
Top Vert. Linearity	R124	Figure 3–10	Adjust for equal horizontal line separation at mid and top screen	Use cross hatch pattern
Bottom Vert. Linearity	R123	Figure 3–10	Adjust for equal horiz line separation at mid and bottom screen	Use cross hatch pattern
Focus	R24	Figure 3–10 Figure 3–11	Adjust for optimum focus	
Brightness Limit	R19	Figure 3–10	Adjust till retrace lines are visible (see notes)	1. Adj BRIGHTNESS and CONTRAST to max 2. Adj R19 3. Adj BRIGHTNESS and CONTRAST for normal viewing

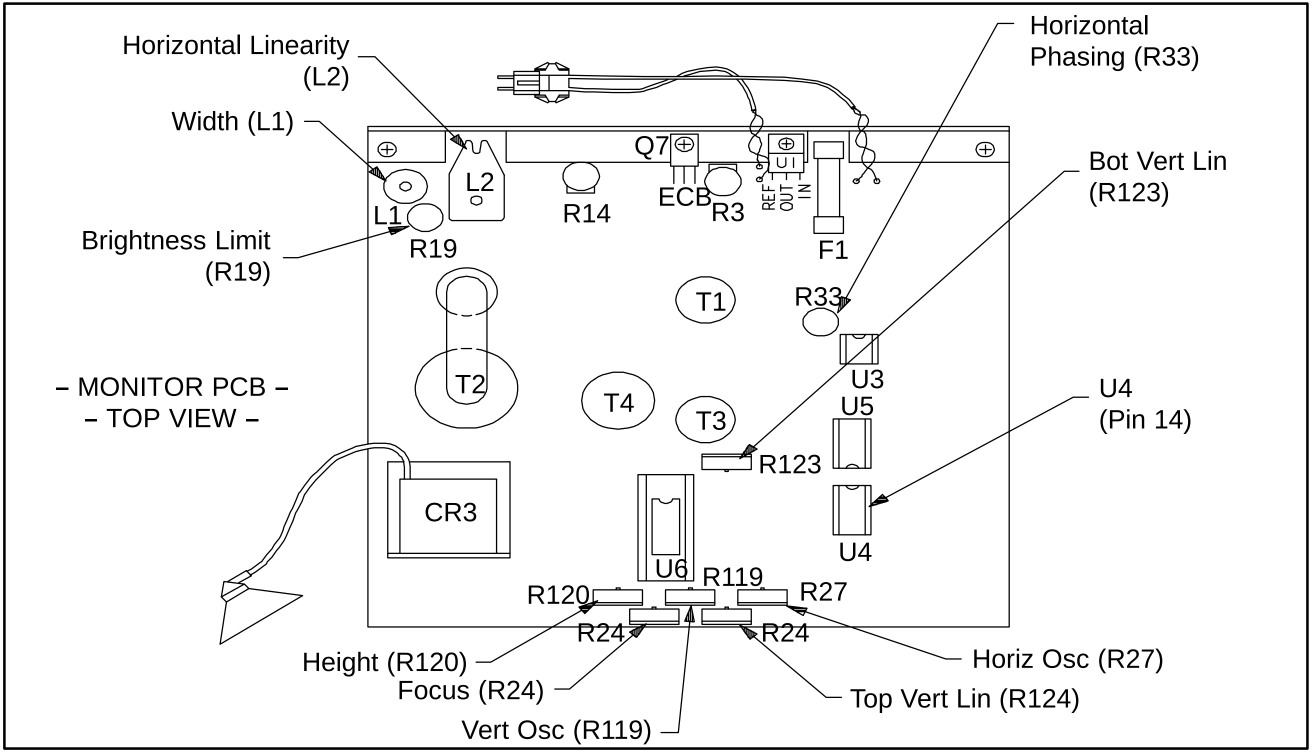


Figure 3–10. Monochrome Monitor Adjustment Locations (P/N 3500-1433) (1 of 2)

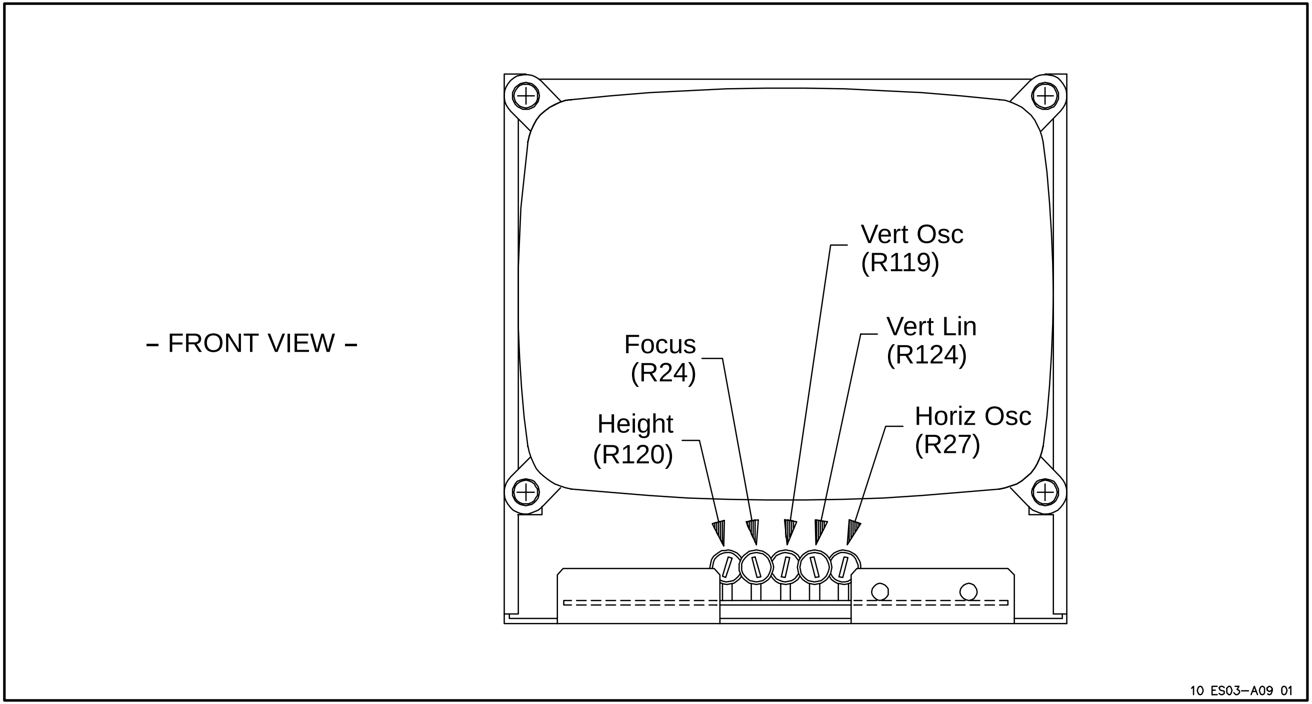


Figure 3–11. Monochrome Monitor Adjustment Locations (P/N 3500-1433) (2 of 2)

3–3.2 Aspect ALM Monitor

WARNING

High voltages exist within the monitor. Use care during adjustment.

Refer to **Figure 3–12** and **Table 3–3** to make the following adjustments.

Preparation

1. Turn system power off.
2. Remove monitor cover.
3. Verify jumper J8 is to the left for 525-line video (NTSC) or to the right for 625-line video (PAL).
4. Turn system and VCR power on. Warm up the monitor for ten minutes.

NOTE: Vertical frequency adjustment requires use of a VCR.

Contrast and Brightness

1. Place system in linear mode.

2. Set CONTRAST to maximum and BRIGHTNESS to minimum.

3. Adjust G2 (grid 2) pot R103 until linear image is just visible in a normally lighted room.

4. Set CONTRAST to minimum and BRIGHTNESS to maximum. Verify screen is uniformly gray with no retrace lines.

5. Adjust R103 until retrace lines disappear.

6. Set BRIGHTNESS to minimum. Verify screen is blanked.

7. Repeat steps 2 – 6 as needed until the monitor meets criteria in steps 4 and 6.

8. Rotate CONTRAST and BRIGHTNESS fully. Verify displayed image responds smoothly.

9. Repeat steps 1 – 8 as needed.

10. Replace Polaroid filter and adjust CONTRAST and BRIGHTNESS for best possible image.

NOTE: Horizontal Centering, Horizontal Width and Aspect Ratio adjustments are interactive. Repeat until all are within specifications.

Horizontal Centering

1. Verify image is correctly positioned on the display.

2. Adjust using Horizontal Phase pot R73 and the CRT deflection rings.

Horizontal Width

1. Verify image width is correct. The first numeral in the date (upper left corner of display) and the “%” or “T” in “PRESET” (lower right corner of display) must be visible when viewed straight on and within ± 0.05 inches of edge when viewed straight on.

2. Adjust L1 until the criteria in step 1 are met.

3. Repeat Centering and Width adjustments until satisfactory.

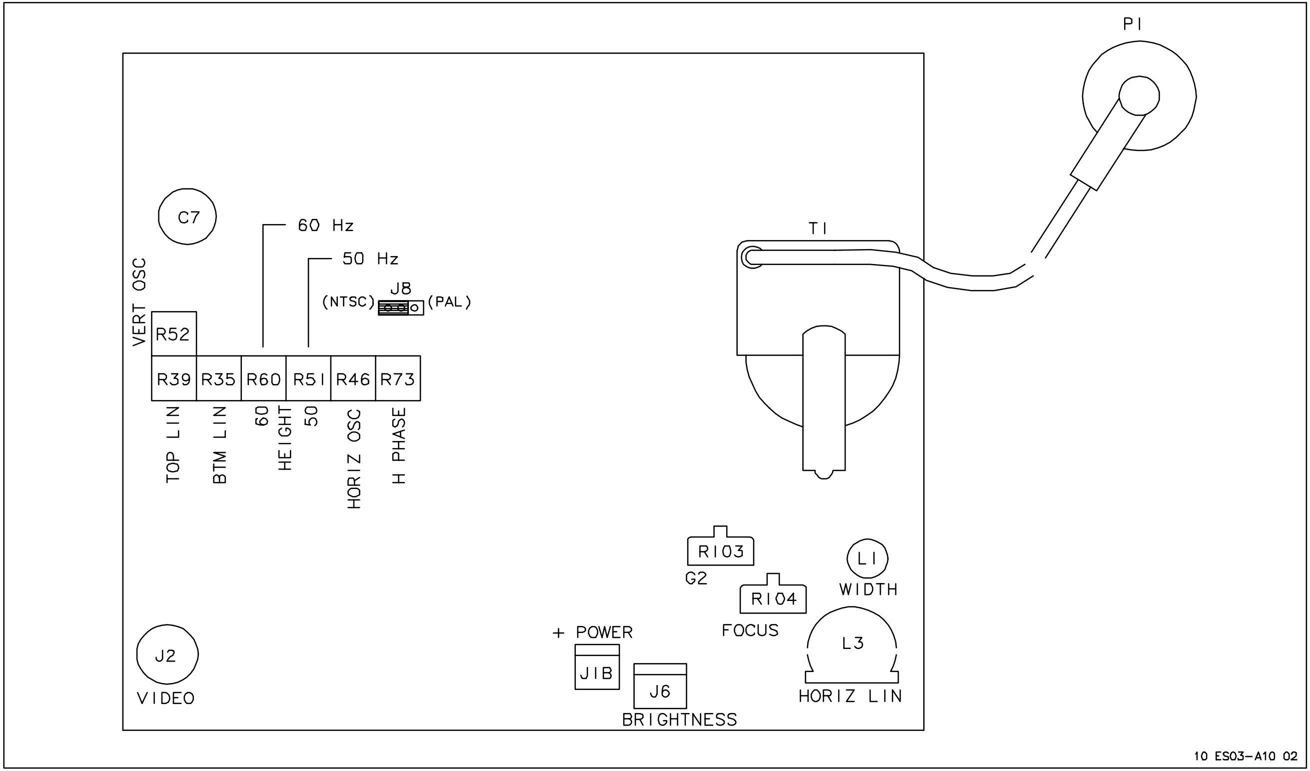


Figure 3–12. Aspect ALM Monitor Adjustment Locations (P/N 3500-1430)

Aspect Ratio (Figure 3–13)

The “caliper” method uses the system calipers and either a *plastic* ruler or marks on a piece of paper to verify that horizontal and vertical lines of the same displayed length are physically the same length.

1. Set the “+” calipers for 100 mm horizontally centered on the display (**Figure 3–13**).

2. Set the “X” calipers for 100 mm vertically centered on the display (**Figure 3–13**).

3. Physically measure the “+” caliper distance on the screen with the *plastic* ruler or mark the distance on a piece of paper.

4. Place the ruler or paper reference beside the “X” calipers.

    a. **525-line video:** adjust R60 (Height), R39 (Top Linearity), and R35 (Bottom Linearity) until these calipers are the same distance apart as the “+” calipers ($\pm$0.05 mm).

b. **625-line video:** adjust R51 (Height), R39 (Top Linearity), and R35 (Bottom Linearity) until these calipers are the same distance apart as the “+” calipers ($\pm$0.05 mm).

5. Repeat width, height, centering and aspect ration until no changes are necessary.

6. Verify that all graphics are visible on screen.

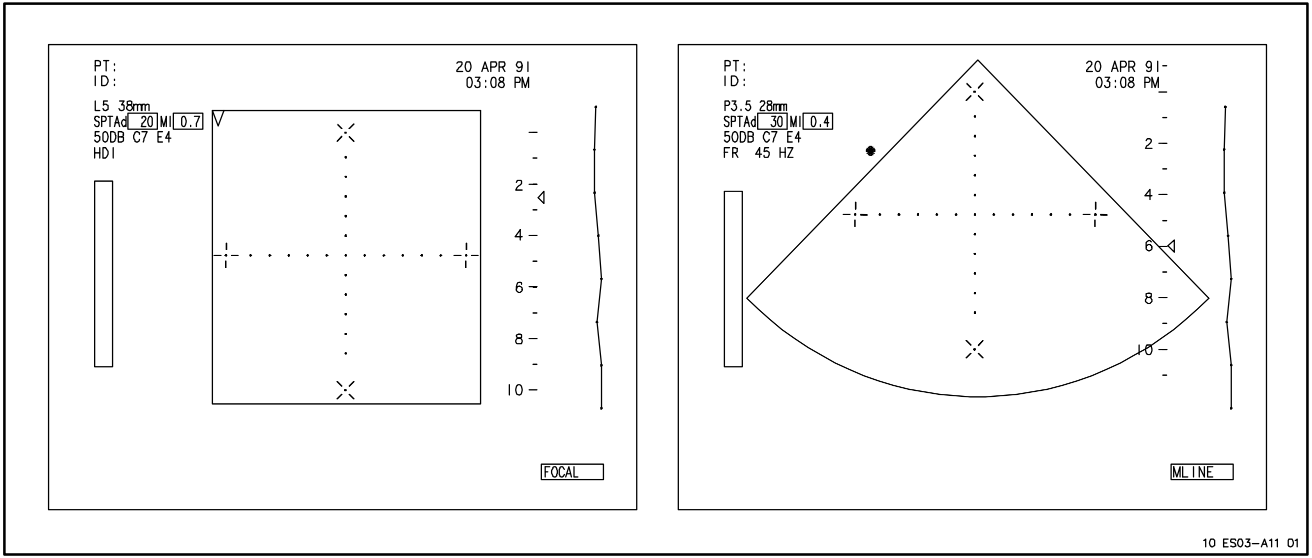


Figure 3–13. Aspect Ratio Test

Vertical Frequency

This procedure works only on grayscale systems. Only the left monitor receives video from the VCR.

1. On systems equipped with a VCR, set the VCR for forward search.
2. If the display rolls, adjust R52 until the image is stable during search procedures.
3. Repeat steps 1 and 2 for reverse search.

Focus

1. Adjust Focus R104 for optimum presentation.
2. Turn off system power and replace monitor cover.

Table 3–3. Aspect ALM Monitor Adjustments (P/N 3500-1430)

Adjustment	Location	Reference	Requirement	Notes
Contrast and Brightness	Display	Figure 3–12	Adjust R103	Ref. page HDI–3–22
Horiz Centering	Display	Figure 3–12	Adjust R73 and CRT deflection rings for centered image	Ref. page HDI–3–23
Horiz Width	Display	Figure 3–12	Adjust L1 for correct image width	Ref. page HDI–3–24
Aspect Ratio	Display	Figure 3–12	Verify lengths of caliper sets are within $\pm$0.05 mm	Ref. page HDI–3–26
Vertical Frequency	Display	Figure 3–12	With VCR in fwd or rev search, adjust R52 for no display roll	Ref. page HDI–3–29
Focus	Display	Figure 3–12	Adjust R104 for optimum focus	Ref. page HDI–3–29

3–3.3 Color Monitors

The UM-9 HDI system has either a Sony color monitor (used on older HDI systems) or a Data Ray monitor (currently used). Both monitors are interchangeable without field modifications. Color monitor field adjustments for both monitors include display size and position. The shape of the display may also be adjusted on the Data Ray monitor (pin cushion and trapezoid adjustments).

CAUTION

Many color monitor adjustments require equipment not available to field personnel. DO NOT make any adjustments other than those described in this section.

CAUTION

Some color adjustments interact. Re-check adjustments to ensure accuracy.

When making adjustments on either type of monitor, use the following procedure to access the appropriate test pattern:

1. Press the SETUP mode button.

2. Press the blank space in the upper right corner of the display four times to access the Production Service Panel.

3. Press VIDEO PR TEST on the Production Service Panel.

4. Press CROSS HATCH or CIRCLE PATTERN (or both) to display a test pattern.

5. Press FLAT BLACK to remove the test pattern from the display.

Sony Color Monitor

Refer to **Table 3–4**, **Figure 3–14** and **Figure 3–15** for Sony monitor adjustments.

Table 3–4. Sony Color Monitor Adj. (2100-0324/2100-0440)

Adjustment	Location	Reference	Requirement	Notes
Horiz. Centering (H. CENT)	DA PCB T502	Figure 3–14	Test pattern centered horizontally	
Horizontal Width (H.W.)	DA PCB L502	Figure 3–14	Test pattern extends to within ±1 mm of left and right edges of monitor	Use circle test pattern
Vertical Centering (V. CENT)	DA PCB RV502	Figure 3–15	Test pattern centered vertically	Use circle test pattern
Vertical Height (V. HEIGHT)	DA PCB RV501	Figure 3–14	Test pattern extends to within ±1 mm of top and bottom edges of monitor	Pot located on end of DA PCB
Horizontal Shift (H.SHIFT)	H PCB RV313	Figure 3–15	Adjust for stable image	
Vertical Hold (V. HOLD)	H PCB RV314	Figure 3–15	Adjust for stable image	1

1. Adjust only if necessary. If adjusted, verify operation with variable reverse speeds of the VCR. If vertical hold is adjusted when the system is warm, it may appear to be adjusted correctly, yet it may be incorrectly adjusted for a system that is powered up cold.

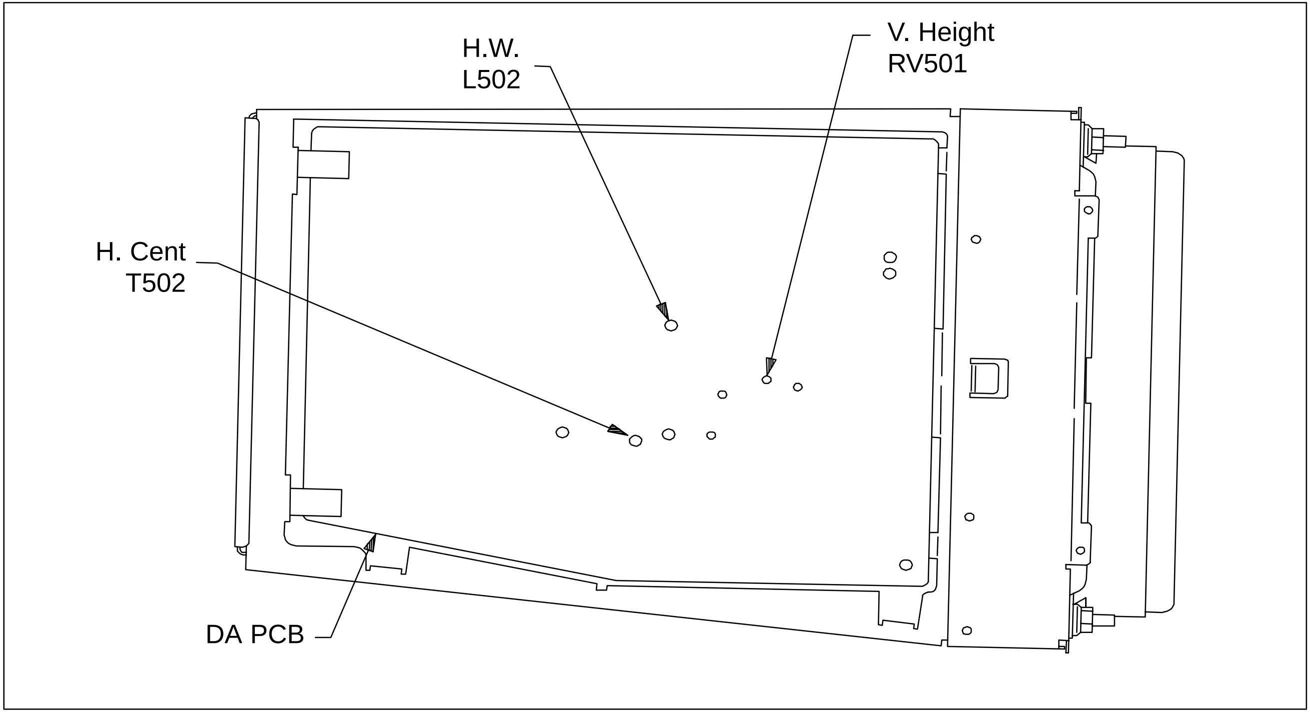


Figure 3–14. Left Side View of Sony Color Monitor Adjustment Locations (P/Ns 2100-0324/2100-0440)

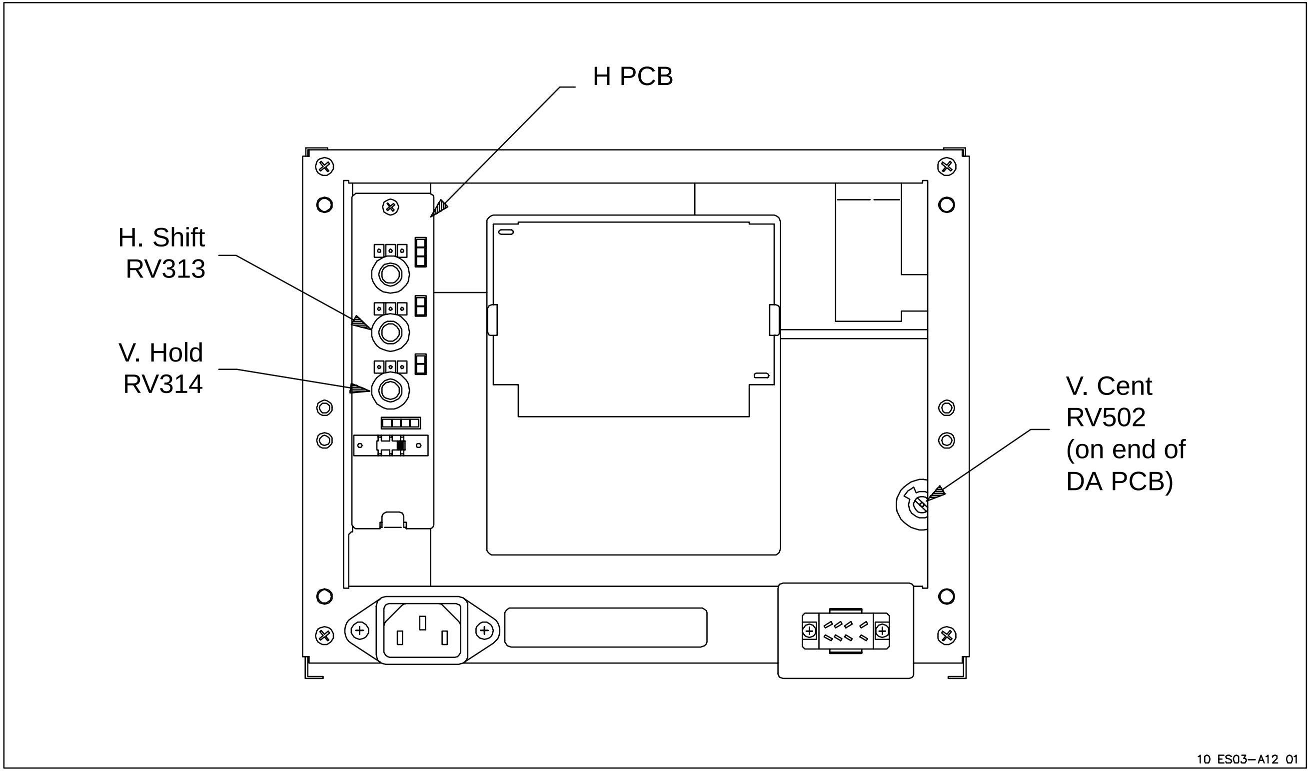


Figure 3–15. Rear View of Sony Color Monitor Adjustment Locations (P/Ns 2100-0324/2100-0440)

Data Ray Color Monitors

Data Ray color monitor adjustments are listed in **Table 3–5** and **Table 3–6** and illustrated in **Figure 3–16** and **Figure 3–17.** When the monitor is installed, some adjustments are obscured by the monitor base. Determine which adjustments should be made, and if necessary use the following procedure to access the adjustments:

1. Turn power off to the monitor.
2. Remove the four monitor mounting screws.
3. Lift the monitor to the rear so the adjustments may be made.
4. Power up the monitor and make the appropriate adjustments.
5. Re-check adjustments and turn power off.
6. Return the monitor to the original position and re-secure.

Table 3–5. Data Ray Color Monitor Adj. (P/N 2100-0668)

Adjustment	Location	Reference	Requirement	Notes
Horizontal Centering	Main PCB R225	Figure 3–16	Test pattern centered horizontally	
Vertical Centering	Main PCB R759	Figure 3–16	Test pattern centered vertically	
Vertical Linearity	Main PCB R712	Figure 3–16	Adjust for equal vertical line separation from left to right.	Use cross hatch pattern
Vertical Size	Main PCB R755	Figure 3–16	Test pattern extends to within ± 1 mm of top and bottom edges of monitor	Use circle test pattern
Side Pin Cushion	Main PCB R757	Figure 3–16	Adjust so sides of test pattern are vertical and not bowed	
Trapezoid	Main PCB R769	Figure 3–16	Adjust for rectangular test pattern	

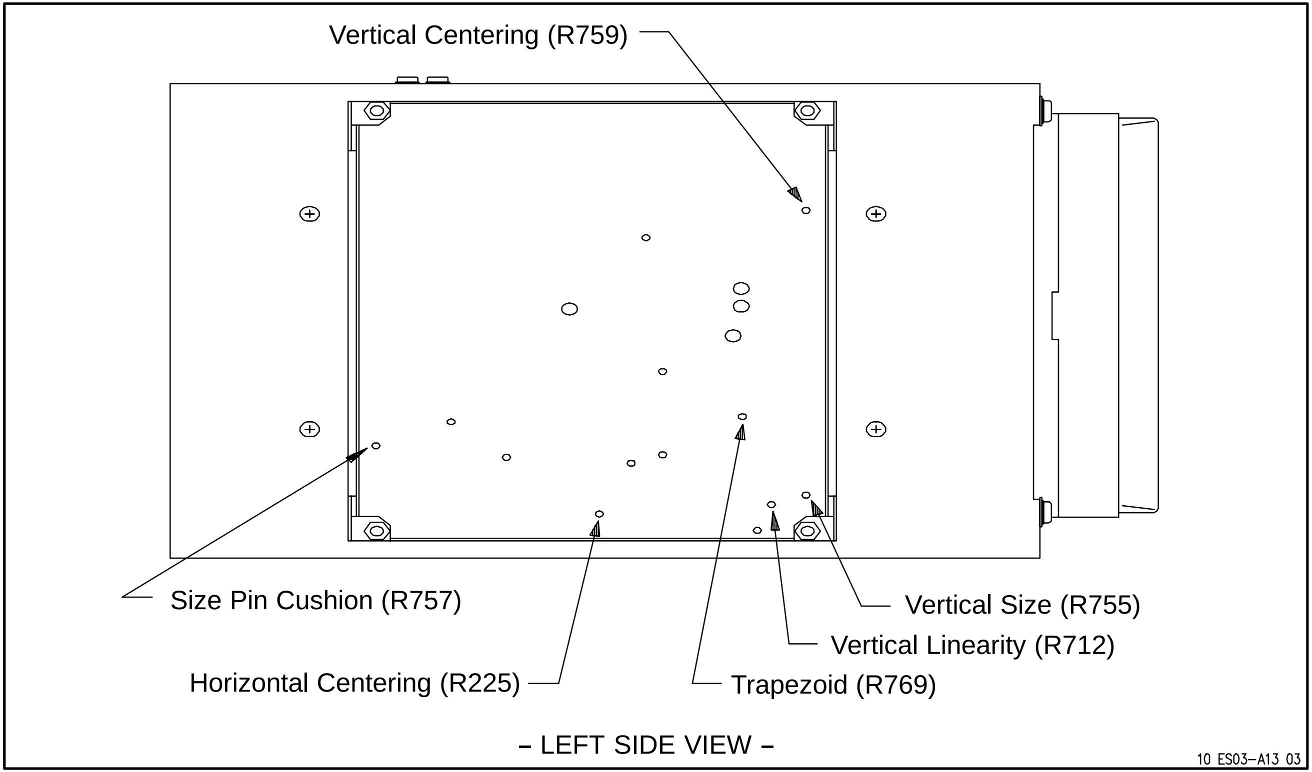


Figure 3–16. Data Ray Color Monitor Adjustment Locations (P/N 2100-0668)

Table 3–6. Data Ray Color Monitor Adj. (P/N 2100-0756)

Adjustment	Location	Reference	Requirement	Notes
Horizontal Centering	Main PCB R606	Figure 3–17	Test pattern centered horizontally	
Horizontal Size	Main PCB R425	Figure 3–17	Test pattern extends to within ±1 mm of left and right edges of monitor	Use circle test pattern
Vertical Centering	Main PCB R746	Figure 3–17	Test pattern centered vertically	
Vertical Size	Main PCB R724	Figure 3–17	Test pattern extends to within ±1 mm of top and bottom edges of monitor	Use circle test pattern
Vertical Linearity	Main PCB R712	Figure 3–17	Adjust for equal vertical line separation from left to right	Use cross hatch pattern
Side Pin Cushion	Main PCB R422	Figure 3–17	Adjust so sides of test pattern are vertical and not bowed	

Adjustment	Location	Reference	Requirement	Notes
Trapezoid	Main PCB R419	Figure 3–17	Adjust for rectangular test pattern	
Parallelogram	Main PCB R418	Figure 3–17	Adjust so opposite sides of test pattern are parallel	Use cross hatch pattern

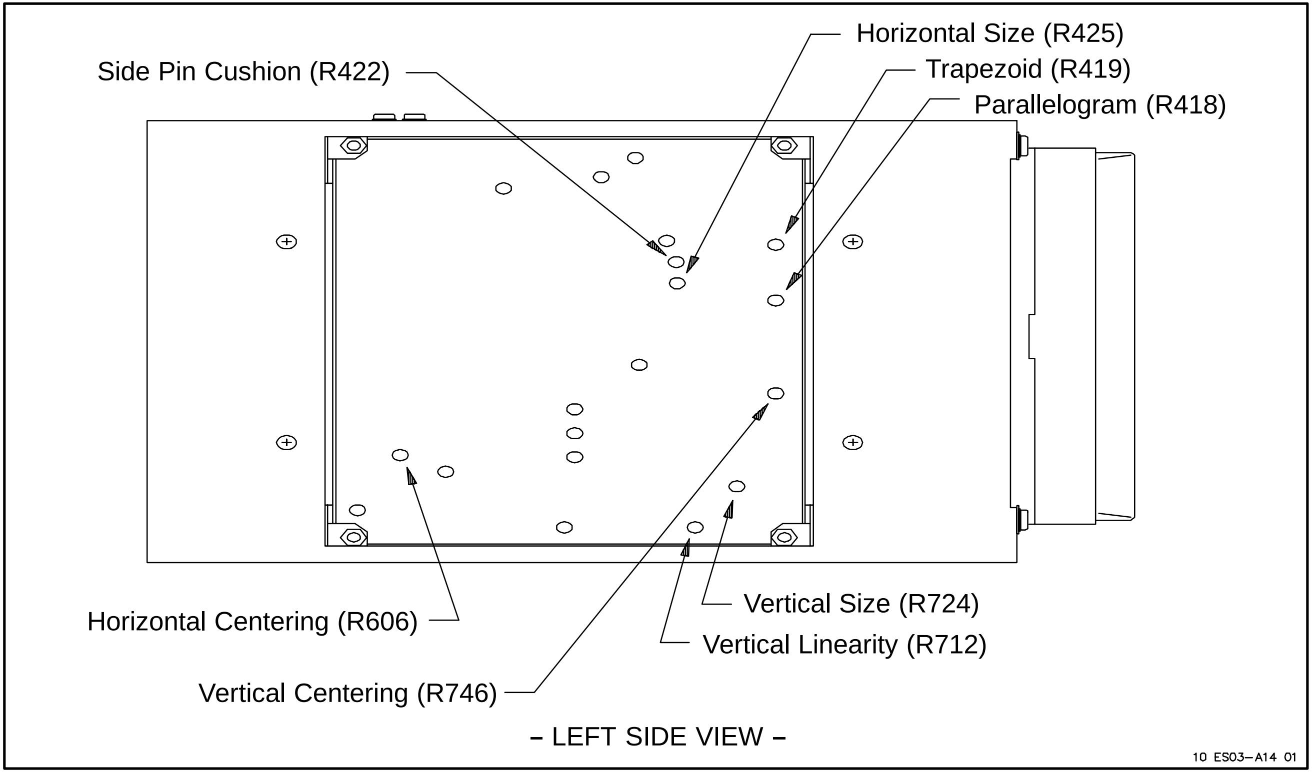


Figure 3–17. Data Ray Color Monitor Adjustment Locations (P/N 2100-0756)

4A Fault Isolation

4A–1 Introduction

This section provides information on preliminary fault isolation procedures, self diagnostics, the PCB LEDs, system minimum configuration requirements, and general fault isolation. For specific information regarding board revision levels and compatibility, refer to Section 5C Configuration.

4A–2 Preliminary Procedure

1. Discuss the problem with the system user when returning their call.

2. If possible, have the user test the system while on the phone.

3. Ask the customer to record the problem using the VCR or hard-copy device if possible.

4. Arrive “on-site” with service documentation.

5. Discuss the problem with multiple users if possible.

6. Document the problem.

7. Refer to the service history to determine if the problem is part of a trend.

8. Use self tests and Section 5C Configuration or Product Configuration Code to determine software revision level.

9. Refer to applicable operating notes, service bulletins, and hot tips for known problems.

10. Perform a complete functional check of the system as per Section 2C. For new installations or difficult problems where the Technical Assistance Center (TAC) would benefit having taped data, use the VCR to record the sequence of operation.

11. Attempt to duplicate the problem.

12. Use self tests to check system operation. Check error logs, checksum panels, and machine physio (power supply voltages and card cage temperature). Refer to paragraph 4A–3. System covers should be left on for this step.

13. Remove system covers and perform the minimum configuration procedure to isolate the problem. Refer to paragraph 4A–12. Do not leave replaced PCBs in the system unless replacement solves a problem. This will help reduce “self-inflicted” faults in systems.

14. If necessary, observe LED operation to assist fault isolation. Refer to paragraph 4A–10.

15. Refer to Section 5C Configuration for information regarding replacement PCB revision levels. Order parts as needed.

16. Call the Product Support Center (PSC) for assistance if the problem cannot be isolated within 30 minutes. Be prepared to convey the troubleshooting approach taken.

4A–3 Self-Diagnostics

The organization of the diagnostics is shown in **Figure 4A–1**. All self-diagnostics are entered using the PRODUCTION SERVICE TEST panel (**Figure 4A–2**). Use the following procedure to enter the test panel:

1. Press the SETUP mode button on the front panel. The SETUP panel is displayed.

2. Press the blank area next to CHANGE SETUPS four times. The PRODUCTION-SERVICE TEST panel is displayed.

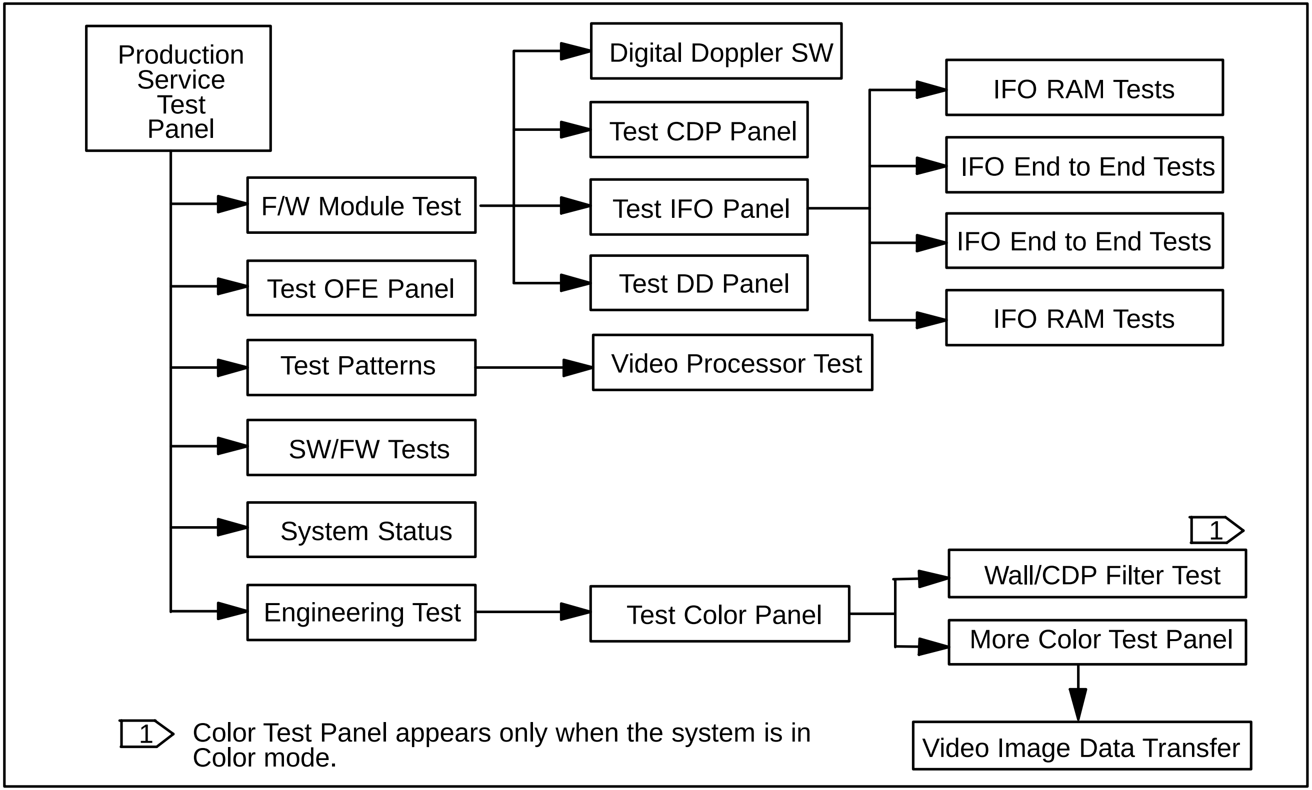


Figure 4A–1. Self Diagnostic Flow Chart

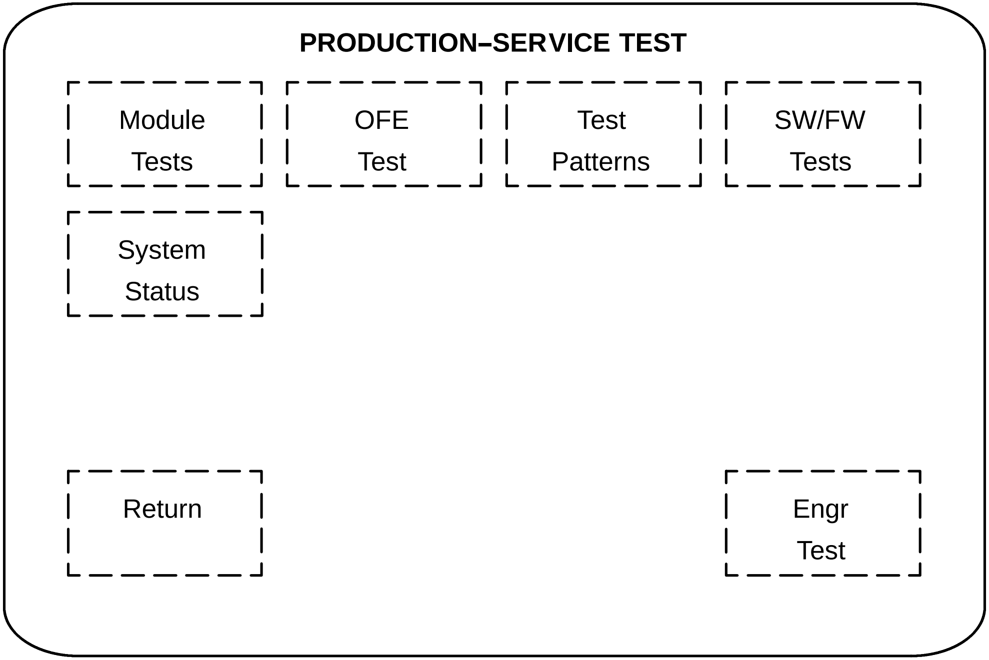


Figure 4A–2. Production Service Test Panel

Module Tests – Displays the F/W MODULE TEST panel (paragraph 4A–4).

OFE Tests – Displays the TEST OFE PANEL (paragraph 4A–5).

Test Patterns – Displays the TEST PATTERNS panel (paragraph 4A–6).

SW/FW Tests – Displays the SW/FW TEST panel (paragraph 4A–7).

System Status – Displays the SYSTEM STATUS panel (paragraph 4A–8).

Engr Tests – Displays the ENGINEERING TEST panel (paragraph 4A–9).

4A–4 Module Tests

Use the F/W MODULE TEST panel (**Figure 4A–3**) to verify operation of the following PCB modules: IFO, CDP, OFE, ADDA, and Image Memory.

IFO Self Tests – Displays the TEST IFO PANEL for individual testing of the Master or Slave IFOMs (paragraph 4A–4.1).

CDP Self Tests – Displays the TEST CDP PANEL (paragraph 4A–4.2).

OFE Self Tests – Executes the front end controller self test (paragraph 4A–4.3).

DDA Test – Displays the TEST DD panel (paragraph 4A–4.4).

DDA SW Test – Displays the DIGITAL DOPPLER SOFTWARE TEST panel (paragraph 4A–4.5).

Image Memory Test – Verifies operation of one 64K image memory page (paragraph 4A–4.6).

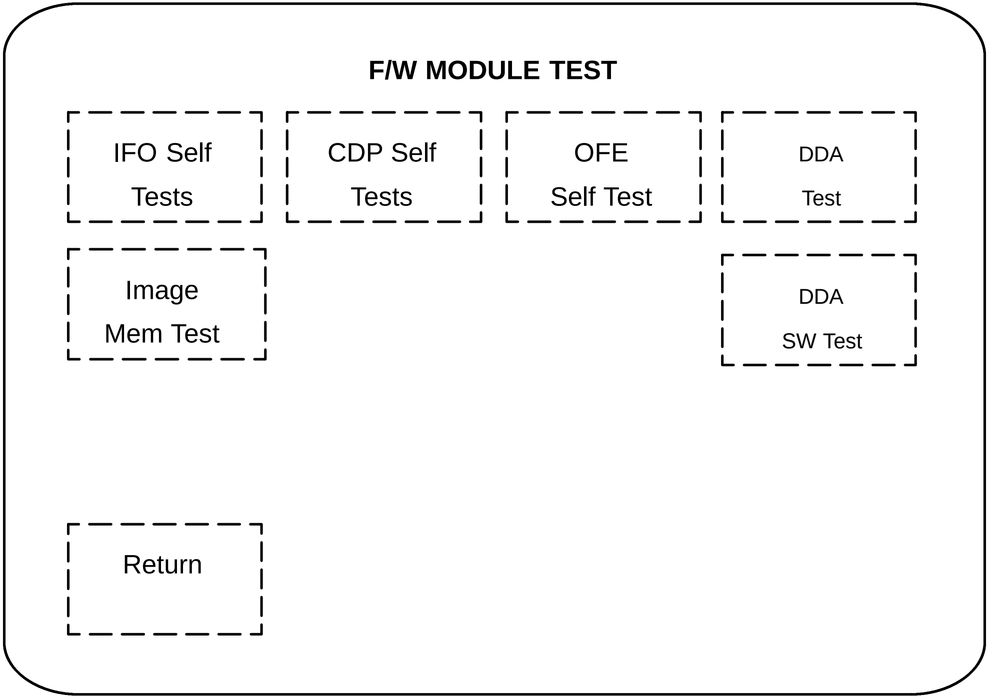


Figure 4A–3. F/W Module Test Panel

4A–4.1 Test IFO Panel

Use the TEST IFO PANEL (**Figure 4A–4**) to test the operational status of the master and slave IFOM PCBs. The test will result in one of three conditions: passed, failed, or timed-out. The results of the test are displayed on the right monitor.

NOTE: Executing the individual tests in this group will leave the system in an unknown state. Select the scanhead after performing any of these tests.

Master Ram Test – Displays the IFO RAM TEST panel and selects the Master IFOM (see page HDI–4A–12).

Slave Ram Test – Displays the IFO RAM TEST panel and selects the Slave IFOM (see page HDI–4A–12).

Master EndtoEnd – Displays the IFO END TO END TEST panel and selects the Master IFOM (see page HDI–4A–15).

Slave EndtoEnd – Displays the IFO END TO END TEST panel and selects the Slave IFOM (see page HDI–4A–15).

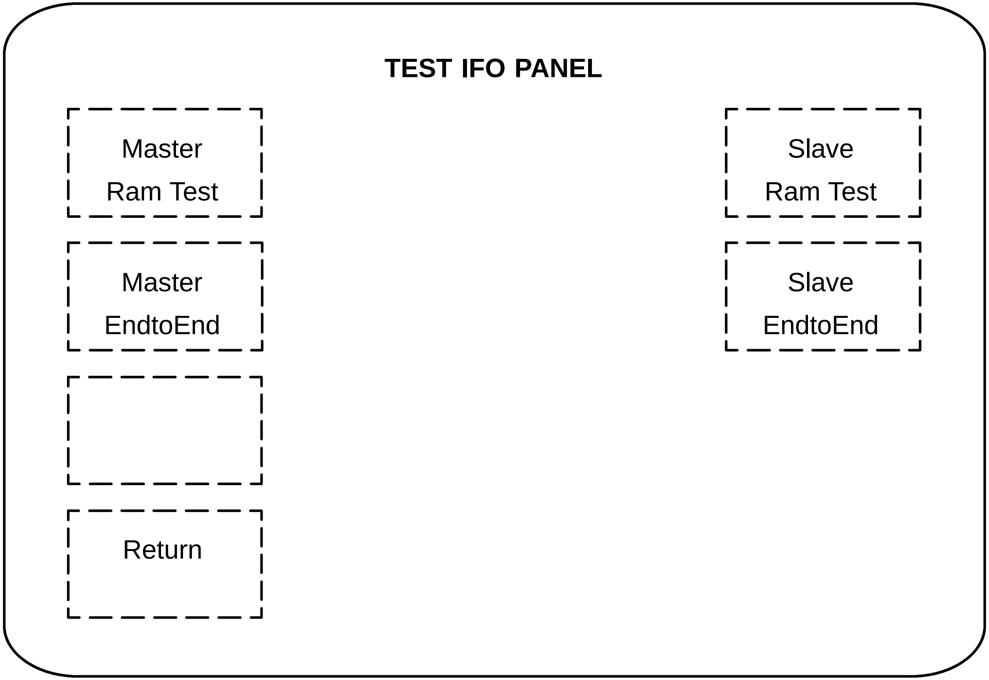


Figure 4A–4. Test IFO Panel

IFO RAM Test Panel (Master/Slave)

Use the IFO RAM TEST panel (**Figure 4A–5**) to isolate circuit failures to the Master or Slave IFOM PCBs depending on whether Master Ram Test or Slave Ram Test was selected from the TEST IFO PANEL. The test will result in one of three conditions: passed, failed, or timed-out. Test results are displayed on the right monitor.

NOTE: The IFO RAM TEST panel is not labelled as being specific for the master and slave IFOM PCBs. It is specific depending on whether the Master or Slave keys are pressed on the TEST IFO PANEL.

If the test times-out or fails:

1. Clear the display by pressing MMODE or DOPPLER mode buttons on the system front panel.
2. Cycle power and repeat the test.
3. Check the SCIP LEDs on the FEC PCB to verify operation of the Front End Controller.

4. If the FEC SCIP LEDs light normally, replace the IFO PCB.

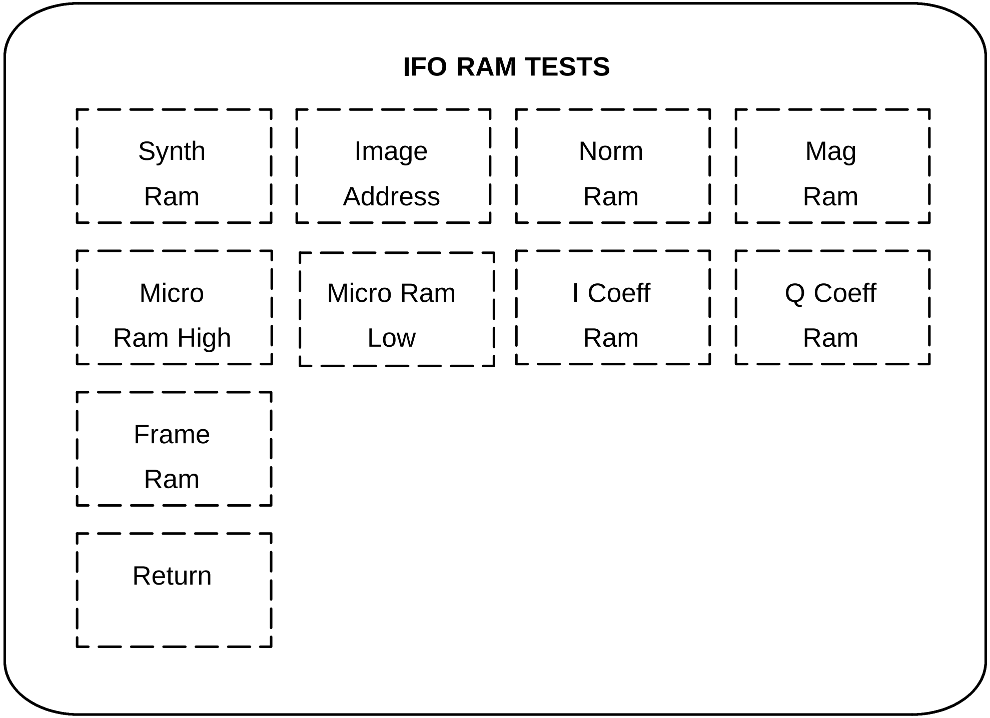


Figure 4A–5. IFO RAM Test Panel

Synth RAM – Writes random data from the MOP to the synthetic aperture RAM and verifies at the MOP that the data is correct. Synth RAM is used in high and maximum line density functions.

Image Address – Generates an address sample which goes to image memory. Tests IFO MOP to image address memory. Primarily for production use.

Norm RAM – Normalization RAM. Compensates for gradual increases in the input signal due to increased aperture. Primarily for production use.

Mag RAM – Magnitude Detector RAM. Echo magnitude detection and log compression – detects 16 bit magnitude echo samples and log compresses to 8 bit echo for B echo bus.

Micro RAM High – Executes the firmware test for the upper 8 bits of the microcode RAM.

Micro RAM Low –Executes the firmware test for the lower 16 bits of the microcode RAM.

I Coeff RAM – Checks I quadrature for spectral Doppler and color 2D. Can be used to determine proper IFO Doppler output to ADDA PCB.

Q Coeff RAM – Checks Q quadrature for spectral Doppler and color 2D. Can be used to determine proper IFO Doppler output to ADDA PCB.

Frame RAM – Executes the firmware test for the frame register RAM.

IFO End to End Test Panel

Use the IFO END TO END TEST (**Figure 4A–6**) to check 2D and PW Doppler data paths on the IFOM PCB(s). Use the test panel to also verify that the IFOM PCB(s) can send and receive 2D and PW Doppler data to and from image memory. For each of the tests on this test panel, the individual test name is displayed on the left side of the monitor and the pass/fail condition is displayed on the right under the master or slave PCB columns.

NOTE: The IFO END TO END TEST panel is not labelled as being specific for the master and slave IFOM PCBs. It is specific depending on whether the Master or Slave keys are pressed on the TEST IFO PANEL.

NOTE: The IFO All Test selection does not execute all of the tests on this test panel. Press all of the test keys to completely check the operational status of the PCB.

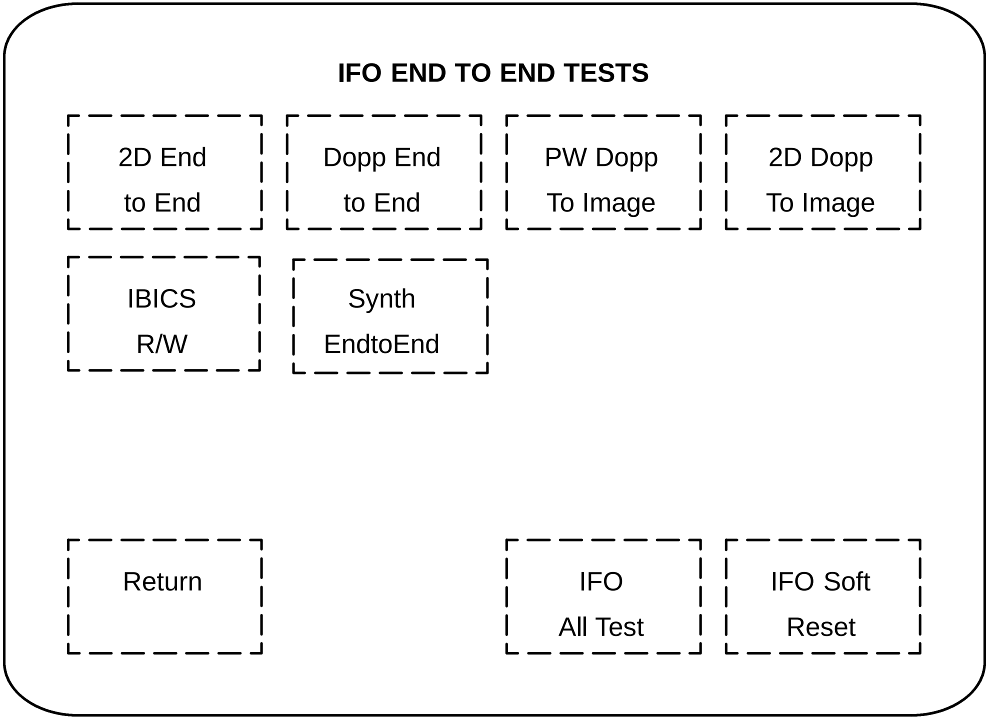


Figure 4A–6. IFO End to End Test Panel

2D End to End – Checks the 2D data path on the IFO PCB only.

Dopp End to End – Checks the Doppler data path on the IFO PCB only.

PW Dopp to Image – Checks the pulsed Doppler path to image memory. Results are read out from image memory by the CPU.

2D Dopp to Image – Checks the 2D color data path to image memory. Results are read out from image memory by the CPU.

IBIC R/W – Image Bus Interface Controller – Executes the firmware test to read from and write to IFO IBICS. Primarily for production use.

Synthetic End to End – Executes the firmware test for the synthetic aperture end to end test.

IFO All Tests –Runs the RAM tests, 2D End to End test, and the Dopp End to End test described above. Reports only pass, fail, or time out.

IFO Soft Reset – Allows for a soft firmware reset with the system unopened. Does not reset hardware. If the system is open, the LED displays a “2”.

4A–4.2 CDP Self Tests

Use the TEST CDP PANEL (**Figure 4A–7**) to check the operational status of the CDP PCB. The test will result in one of three conditions: passed, failed, or timed-out. The results of the test are displayed on the right monitor.

NOTE: Executing the individual tests in this group will leave the system in an unknown state. Select the scanhead after performing any of these tests.

If the test times out or fails:

1. Repeat the test. If the test times-out repeatedly, cycle power and repeat the test.

2. Check the SCIP LEDs on the FEC PCB to verify operation of the front end controller.

3. If the SCIP LEDs give the proper indications, check the SCIP LEDs on the CDP PCB. These LEDs can function even if FEC LEDs do not.

4. If the CDP LEDs are not functional, replace the CDP.

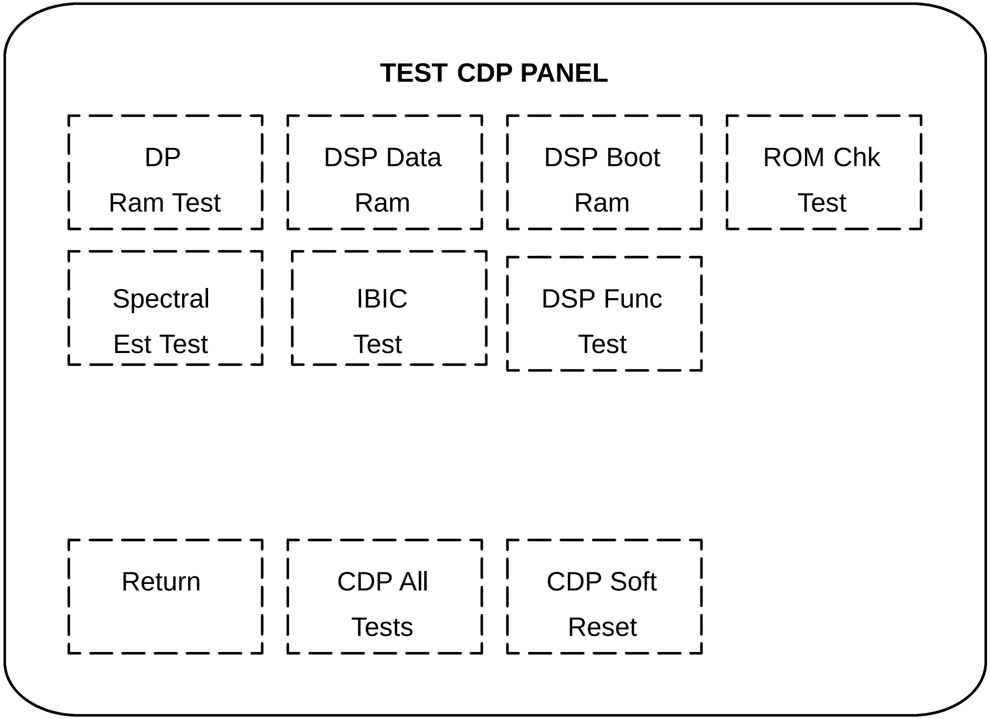


Figure 4A–7. Test CDP Panel

DP Ram Tests – Dual port RAM test. Tests the RAM that is accessible by the MOP. The SCIP side of RAM was tested at system power-up. Primarily for production use.

DSP Data Ram – Digital Signal Processor (DSP) RAM. Tests DSP data memory ping-pong RAM. Primarily for production use.

DSP Boot Ram – Checks the DSP Boot Memory area. This is the only time that this RAM is tested, as the DSP's only have access to the read capability of the RAM. Primarily for production use.

ROM Chk Test – Checks the CDP ROM by calculating the checksum. Primarily for production use.

Spectral EST Test – Verifies that the CDP can write to the spectral estimator interface.

IBIC Test – Evaluates the I/Q IBIC's, the IBIC output FIFO's, the write address memory, and its associated control logic.

DSP Func Test – Checks the functionality, internal memory, external memory, and program memory of each DSP. The results are displayed on the right monitor indicating a pass/fail condition for each DSP. DSP locations are as follows:

DSP 1	U32
DSP 2	U45
DSP 3	U33
DSP 4	U46
DSP 5	U34
DSP 6	U47

CDP All Tests – Runs all of the above tests.

CDP Soft Reset – Allows for a soft firmware reset with the system unopened. If the system is opened, both LEDs display an “A” .

4A–4.3 OFE Self Test

Use the OFE SELF TEST to execute the Front End Controller self test and display the results on the right monitor. Validates the following categories with the following bit positions allocated:

Category	Bit
Inter sequencer primary RAM	0
Inter sequencer alternate RAM	1
TGC ping RAM	2
TGC pong RAM	3
Gate-array sequencer block start address RAM	4
Front end to channel board interface	5
Daughter board mux RAM	6
Not used	7
Gate-array sequencer control RAM (8 sections)	8–15
Intra sequencer RAM (8 sections)	16–23
Channel board RAM (8 boards)	24–31

The returned string is all 0's if it passes (00000000). The first two digits represent byte 0, the second two digits represent byte 1, etc. If there is a failure, the following bit positions are displayed on the monitor:

Byte 0	Byte 1	Byte 2	Byte 3
7–0	15–8	23–16	31–24

If there is an error, refer to the bit positions and the categories using the text above. An error code of 40000000 (byte 0) indicates a faulty daughter board. All other error codes in byte 0 indicate a faulty FEC board. All error codes in bytes 1 or 2 also indicate a faulty FEC board. All error codes in byte 3 indicate a faulty Channel board. Use **Table 4A–1** to determine which Channel board is faulty.

Table 4A–1. OFE Error Codes and Channel Board Indications

Error Code	Channel Board
00000001	0 (Slot 22)
00000002	1 (Slot 23)
00000004	2 (Slot 24)
00000008	3 (Slot 25)
00000010	4 (Slot 26)
00000020	5 (Slot 27)
00000040	6 (Slot 28)
00000080	7 (Slot 29)

4A–4.4 Test DD Panel

The TEST DD PANEL (**Figure 4A–8**) is primarily used for engineering purposes to check the operational status of the ADDA PCB.

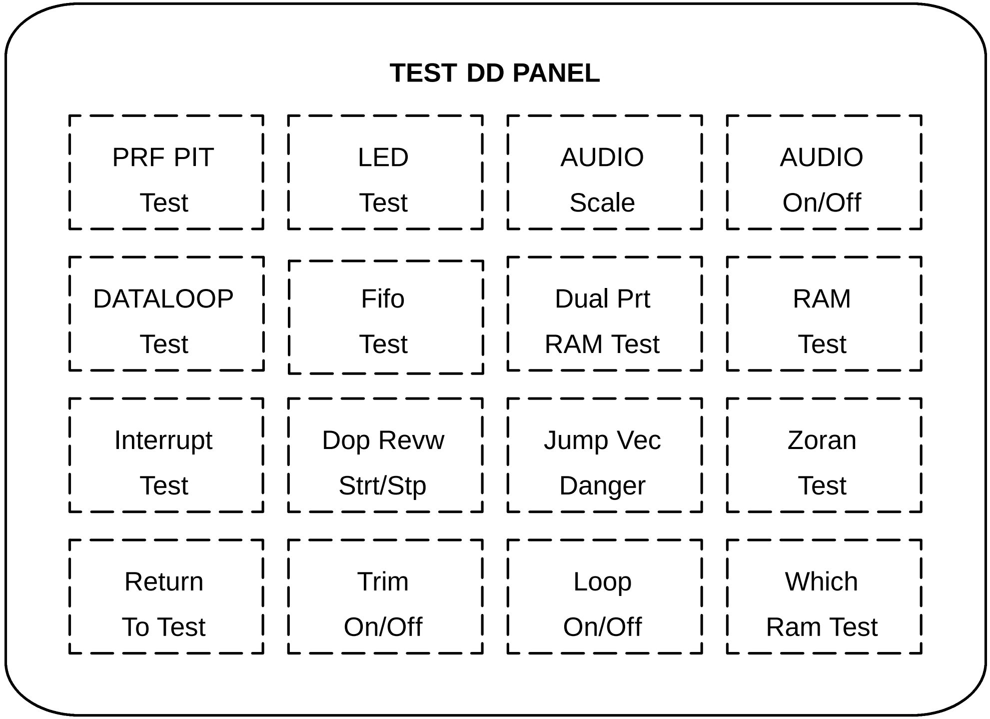


Figure 4A–8. Test DD Panel

PRF PIT Test – For engineering purposes only.

LED Test – Tests hex LEDs on ADDA PCB. Each LED should display "0" through "F" on one LED, then switch to the other LED and do the same.

Audio Scale – Selects either a sine or triangular wave setting. It is used for testing the audio circuitry associated with the ADDA PCB. The audio will be heard on the system speakers.

Audio On/Off – Turns the audio scale on and off. The volume is controlled by the volume control on the left side of the system. The audio tone should alternate from one speaker to the other.

Dataloop Test – Initiates a comprehensive test of the 80186. FIFO's, and the DSP's (digital signal processors). These tests check the operation of the interrupts for each DSP, the operation of the DMA (direct access memory), the Dual Ported RAM, and the IBIC's. All data is monitored by the 80186 MOP. Results are pass/fail.

FIFO Test – Performs a DMS of known data from the FIFO's through the IBIC's into Image Memory. Then from Image Memory back to the FIFO's for validation by the 80186 MOP. Results are pass/fail.

Dual Prt Test (Dual Port RAM Test) – Performs a data read-write verification and an address bit verification for various RAM locations. Results are pass/fail.

RAM Test – Performs a data read-write verification and an address bit verification for various RAM locations. The specific RAM test is selected by the Which Ram Test key.

Interrupt Test (Interrupt Latch Test) – Causes the 80186 MOP processor to reset all interrupt latches, and then checks to see if they are set. Results are pass/fail.

Dop Revw Start/Stop – For engineering purposes only.

Jump Vec *Danger* – For engineering purposes only.

ZORAN Test – For engineering purposes only.

Trim On/Off – For engineering purposes only.

Loop On/Off – Toggles any test to the “do-forever” state or to off.

Which RAM Test – Cycles through all available RAM tests. If a RAM test has been selected using this key, only that RAM test will be tested when the RAM Test or Dual Port RAM Test leys are pressed.

4A–4.5 Digital Doppler Software Test Panel

The DIGITAL DOPPLER SOFTWARE TEST panel (**Figure 4A–9**) is for engineering use only.

IW Write Sin – For engineering purposes only.

IW Write Ramp – For engineering purposes only.

Grayscale Curve – For engineering purposes only.

Dop Play Enable – For engineering purposes only.

Enble DD Msg Disp – For engineering purposes only.

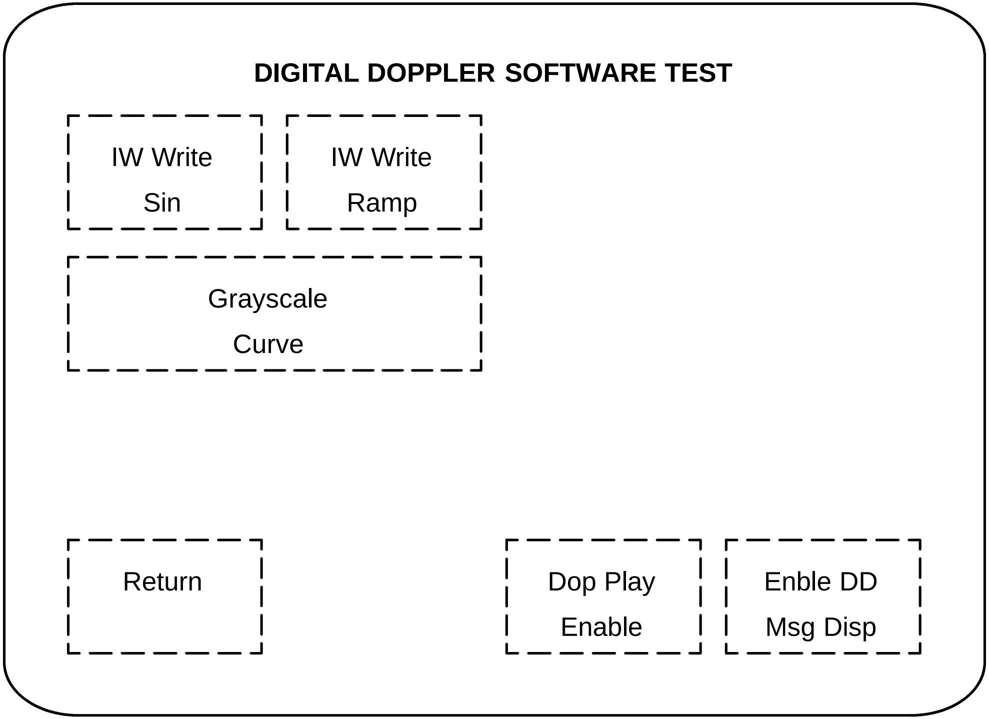


Figure 4A–9. Digital Doppler Software Test Panel

4A–4.6 Image Memory Test

Use the Image Mem Test to verify operation of one 64K image memory page. The pass/fail message is displayed at the lower left corner of the left monitor. The test does not check the entire image memory.

4A–5 Test OFE Panel

Use the TEST OFE PANEL (**Figure 4A–10**) to check individual channels or boards in the front end. It also checks all channels, simulating a transducer for testing, initiating a pulser calibration, or checking a transducer temperature.

Transmit on Channel Board Up/Down – Allows the user to select the scanhead element (channel) or board that will be used during transmit. The number of the transmitting element is displayed on the right video monitor. As the number is incremented or decremented several times, the displayed number of the channel board changes. Pressing the key once increments or decrements the transmitting element by one number.

Receive on Channel Board Up/Down – Allows the user to select the scanhead element (channel) or board that will be used during receive. The number of the receiving element is displayed on the right video monitor. As the number is incremented or decremented several times, the displayed number of the channel board changes. Pressing either key once increments or decrements the receiving element by one number.

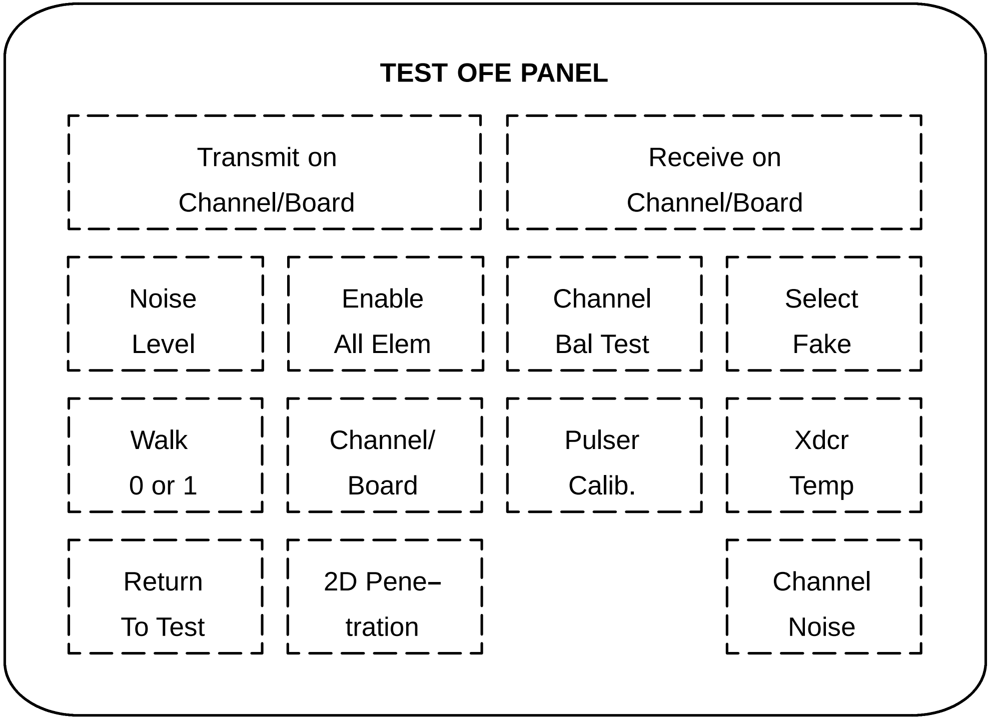


Figure 4A–10. Test OFE Panel

Noise Level – For engineering use only.

Enable All Elem – Allows the user to turn on all receive elements in the front end. This key can be used after the Channel Noise Tests to turn on all channels that were left off from this or other tests. Press this key before and after each test to ensure uniform test results.

Channel Bal Test – For engineering use only.

Select Fake – Allows the user to select a fake scanhead for use in testing. After selecting the appropriate faked scanhead, immediately press the XDCR key on the front panel, and apply the fake to the appropriate scanhead connector. The fake TEST 5.0 MHZ is required for the channel noise tests. Selecting one faked scanhead automatically disconnects the previously selected fake scanhead.

Walk 0 or 1 – Determines whether all of the channels on a board but the selected channel are used for transmit/receive tests (walk 0) or whether the selected channel is used for some tests (walk 1).

Channel/Board – Allows the user to select the entire Channel PCB or individual channel elements on the board. Once selected, transmit or receive tests may be performed on the entire PCB or individual channels.

Pulser Calibration – Forces a calibration of the pulser circuitry. If an error code is displayed, use the following information to determine which channel board or voltage is faulty:

The error code is displayed as a string of eight zeros (00000000). Each of the positions represents a channel board.

1st 0 = board 1

2nd 0 = board 0

3rd 0 = board 3

4th 0 = board 2

5th 0 = board 5

6th 0 = board 4

7th 0 = board 7

8th 0 = board 6

Also, if characters 1 through 4, 8 or A are displayed in any of the positions, the codes represent the following problems:

1 = Voltage out of the board

2 = Voltage in from the Pulser Power Supply

3 = Power out of the channel board

4 = Current

8 = Output current too high

A = 2 and 8

If there is a fault indication on the board, check the inputs and outputs as required to isolate the problem, adjust if possible, and/or replace the faulty assembly. Refer to Section 3, Adjustments if necessary.

Xdcr Temp – Displays the temperature from the three thermistor amplifiers.

2D Penetration – For engineering use only.

Channel Noise – Selects either the entire channel PCB or the individual channel on a Channel PCB to be enabled or disabled. Refer to the procedure below to check channel noise.

This channel noise test performs a noise test of each receive channel in the front end. The gains from all channels are displayed on the left monitor as shown in **Table 4A–2**.

NOTE: The Channel Noise Test requires that the system have a Faked Test 5.0 MHz Scanhead selected.

NOTE: Run this test twice to verify results.

1. Press SELECT FAKE on the OFE TEST Panel several times until TEST 5.0 MHZ is displayed on the right monitor. (TEST 5.0 MHZ is the selection after “NO TRANSDUCER”.) The screen will appear as follows:

   FAKED: TEST 5.0 MHZ

2. Press the XDCR mode button on the UM-9 HDI front panel. The TRANSDUCER SETUP Panel is displayed.

3. Press any of the transducer keys. Verify TEST 5.0 MHZ is displayed.

4. Press the 2D mode button on the UM-9 HDI front panel to return to 2D imaging.

5. Press the SETUP mode button on the front panel.

6. Press the blank area next to CHANGE SETUPS four times to enter the PRODUCTION-SERVICE TEST panel.

7. Select OFE TEST on the PRODUCTION-SERVICE TEST Panel.

8. Set up the noise test as desired using the other keys on the OFE TEST PANEL. Press CHANNEL NOISE to begin the test.

9. Wait approximately one minute. The results are displayed as in **Table 4A–2.** The right monitor displays the per channel receive noise pattern for element 1 on the left peak, and element 0 on the right peak.

10. Repeat steps 7 through 9. The values displayed for MIN and MAX should be within five dB of the value for TYPICAL.

11. Select ENABLE ALL ELEMENTS.

12. Repeat this procedure using another fake scanhead before continuing with any other diagnostics.

Table 4A–2. Channel Noise Test Results Display

BD	ELEMENT 1				ELEMENT 0				
	D0	D1	D2	D3	D0	D1	D2	D3	
0	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	CH0
	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	CH1
1	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	
	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	
2	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	
	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	
3	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	
	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	
4	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	
	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	
5	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	
	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	
6	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	

	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x
7	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x
	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x	xx.x

TYPICAL = -xx dB BDCE B = Board C = Channel D = Device E = Element

MIN = -xx dB at nnnn

MAX = -xx dB at nnnn

Channel PCB Selected – No Number Specified

The letter “B” indicates an entire Channel PCB has been selected to either transmit or receive while all others have been disabled. If individual channels are to be tested, the letter “C” would be displayed. A “0” instead of the “1” indicates that one board or channel is disabled while all others are enabled. The asterisk indicates that the specific board or channel is not selected yet.

B1*

Channel PCB Selected – Board Number Specified

“XMIT: 1” indicates Channel PCB #1 is the only PCB transmitting. All others are disabled. Since the board number is in hex notation, the “1” indicates the second PCB of the eight Channel PCBs. A “0” indicates the first PCB and “7” the last.

B1 BD
XMIT: 1
RCV:

Figure 4A–11. Channel Noise Test Display Annotations (1 of 2)

Individual Channel of the Channel PCB Selected

If an individual channel is to be tested, the letter “C” is displayed. The “1” indicates that one channel is enabled and all others are disabled.

```
C1   ELE  PIN  BCDE
XMT:   2  U4  0101
```

Indicates the transducer element

Indicates the active pin of the scanhead select PCB

“B” indicates the specific board. “C” indicates the channel on that board in hex-notation. “D” indicates the device (ASIC) on the board, and “E” indicates the element (1 to 128) going from the scanhead connector to the Channel board.

Figure 4A–11. Channel Noise Test Display Annotations (2 of 2)

4A–6 Test Patterns

Use the TEST PATTERN panel (**Figure 4A–12**) to display various test patterns on both video monitors. The test patterns are used to check operation of the video circuitry and to adjust the monitors.

Video Pr Test – Displays the VIDEO PROCESSOR TEST panel (paragraph 4A–6.1).

CF Test Pattern – The color flow test displays the color flow test pattern on the monitor. Before beginning this test, press the COLOR mode button on the front panel and set the filter type to 0.

NOTE: Set CF TEST PATTERN to OFF before returning to normal scanning.

OFE Test Pattern – Enables a test pattern to be displayed on both monitors. The test pattern is dependent on the selected scanhead.

Resolut Key Test – For engineering use only.

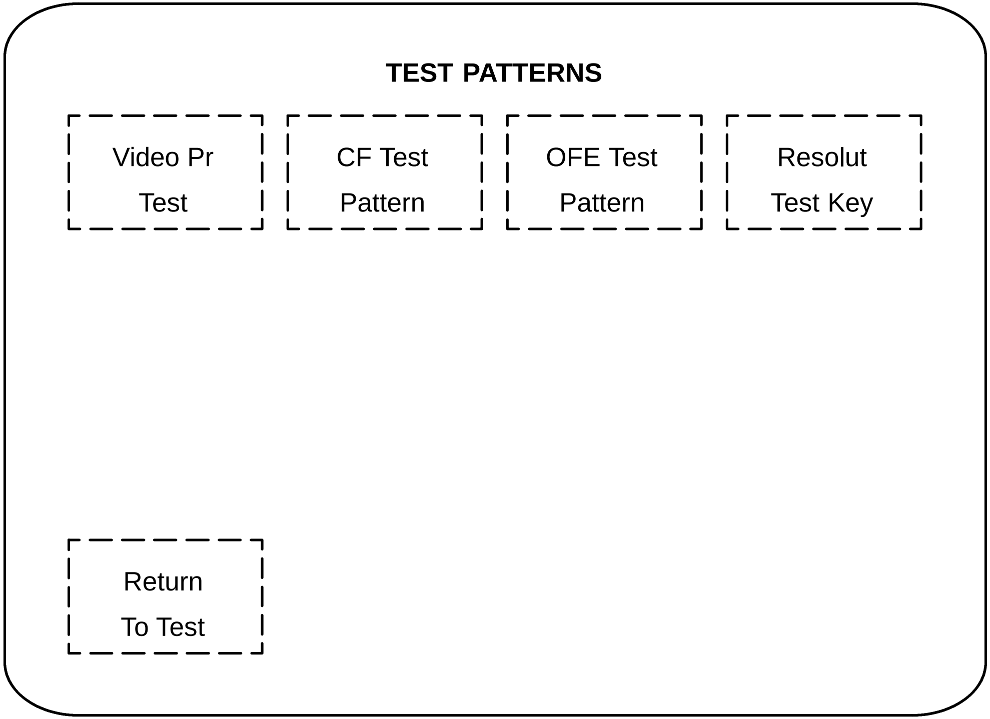


Figure 4A–12. Test Patterns Panel

4A–6.1 Video Processor Test Panel

Use the VIDEO PROCESSOR TEST panel (**Figure 4A–13**) to verify the operational status of the AVP PCB.

Color Bar RGB – Displays a color bar on the left monitor and a split screen black and white background on the right monitor.

Monitor Balance – Displays a black background on the left monitor with a white box in the center of the screen. On the right monitor, displays a white background with a black box in the center of the screen.

Flat White – Displays a flat white screen on both monitors.

Flat Black – Displays a flat black screen on both monitors.

Gray Shades – Displays 16 gray shades on both monitors.

Cross Hatch – Displays a white cross-hatch pattern on a black background on both monitors.

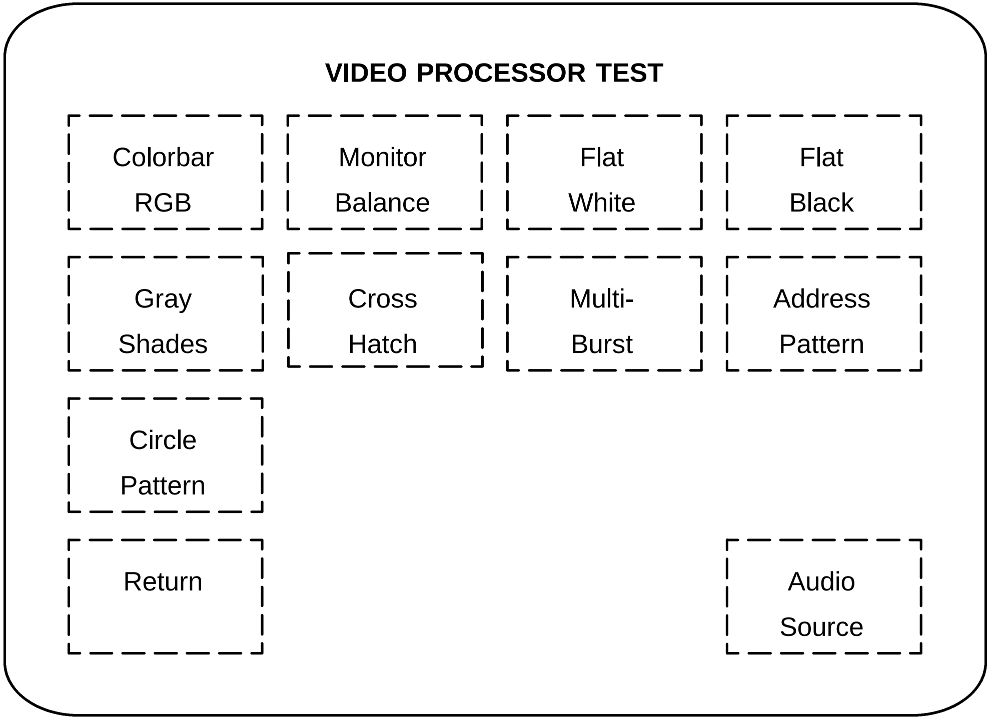


Figure 4A–13. Video Processor Test Panel

Multi-Burst – Displays various line thicknesses in black and white running vertically across both monitors. Used to determine the VCR record frequency response.

Address Pattern – Displays a color scale and grayscale on the left monitor. The color scale changes at a timed interval to show two colors of M-mode map, 2D map, and frame grab map. On the right monitor, the same pattern is displayed in black and white.

Circle Pattern – Displays a circle with 2 lines intersecting at the center on both monitors. The background and circle colors depend on whether flat black or flat white was selected before the circle pattern was selected.

Audio Source – Selects between VCR audio or Doppler audio source.

4A–7 SW/FW Test Panel

Use the SW/FW TEST panel (**Figure 4A–14**) to determine the software and firmware versions installed in the system.

Software Version – Displays the installed software release number briefly on the left monitor.

Firmware Rev Level – Displays the control bus address, module name, firmware level, and checksums on the left side of the left monitor. Displays SCIP bus data on the right side of the left monitor.

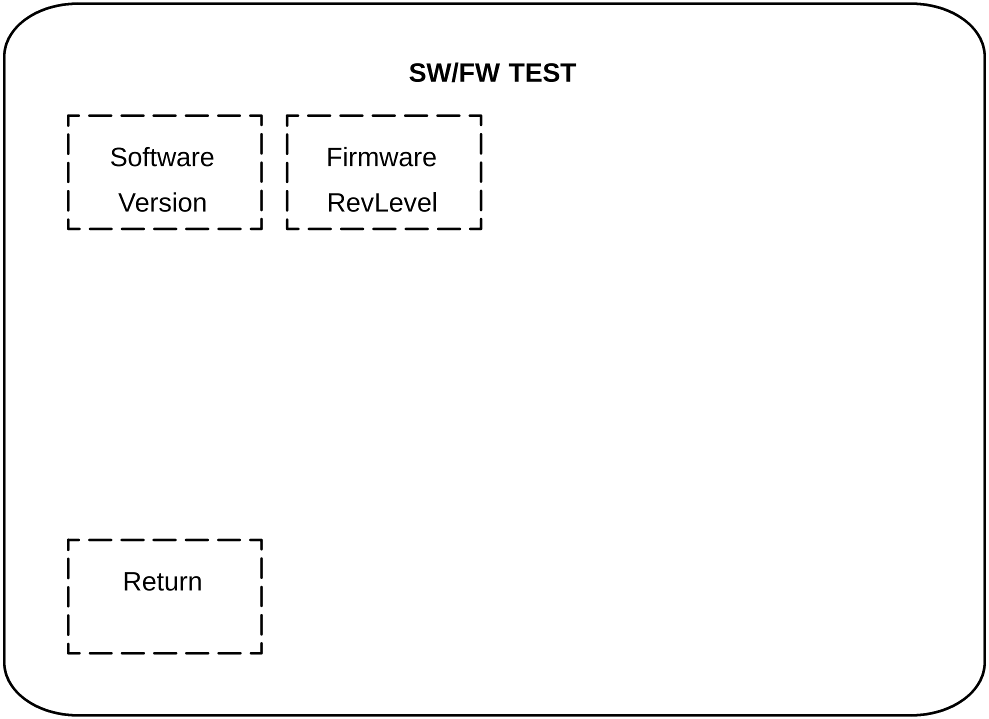


Figure 4A–14. SW/FW Test Panel

4A–8 System Status Panel

Use the SYSTEM STATUS panel (**Figure 4A–15**) to obtain information useful or necessary to debug the system.

Error Tally – Not currently functional.

Error Log – Displays the error log on the left monitor. The error log is especially useful if a fault exists in a control bus resident. The first two values in the DATA field can contain the control bus address, in hex, of a control bus resident that has reported a fault. The error data is stored in CMOS RAM. Print the error tally by pressing the left print key (L PRINT) on the control panel. Press FIRMWARE LEVEL twice to see a current list of the control bus residents and their addresses. (If not pressed twice, inaccurate information may be displayed.)

- SEQ# (sequence number) – indicate the order in which the error codes occurred.
- MOD-ID (module identification) – identify the faulty module.

- ERROR – correspond to error codes listed in the error tally.

- DATA (user field) – the first two values are hex values that correspond to the control bus address of a faulty module. The second two values are the message type. There are several hundred message types. It is not practical to list them all. The importance of the DATA field lies with the identification of a specific module. If the module identified in the DATA field is capable of the symptoms that have been identified, assume it is the source of the problem and should be replaced.

- DATE and TIME – indicate the date and time the error occurred.

Config Table – Displays four pages of configuration information which is used to set up system functionality. The first two pages contain hardware information and the third and fourth pages contain software information. Refer to **Tables 5B–5** and **5B–6**.

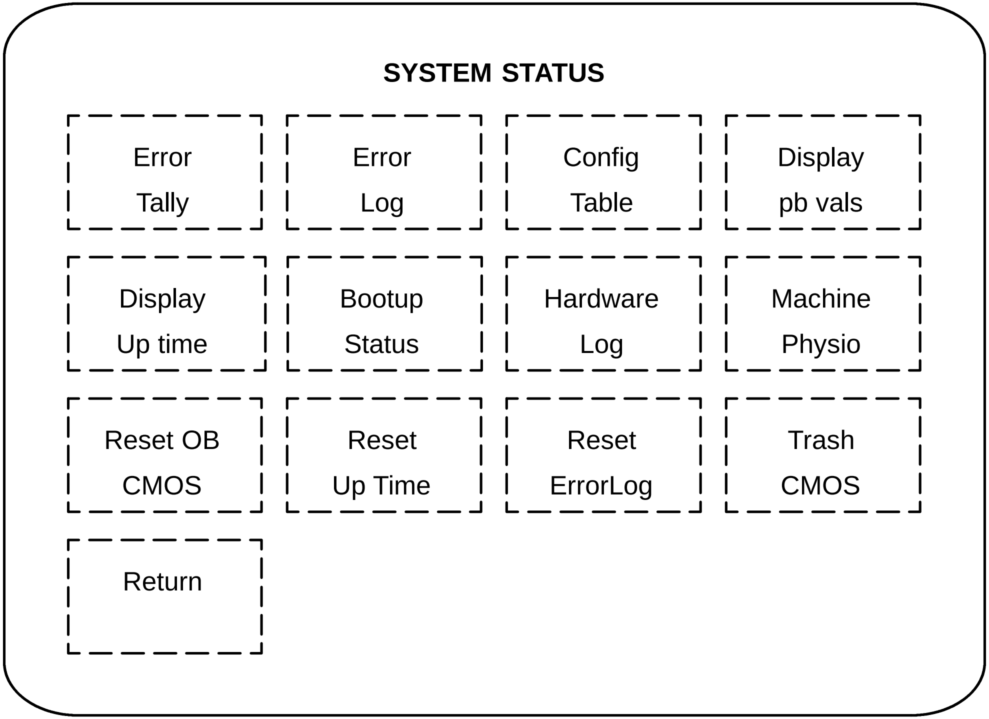


Figure 4A–15. System Status Test Panel

Display pb Values – Displays four pages of pb (public block) values. This information includes data on depth, PRF, output and other data. The information in the public block is useful when communicating system condition to engineering. Press the touch panel again to toggle to the following pages.

Display Up Time – Displays system up-time. Not reset at the factory. Display Up Time is a required entry on the FSR.

Bootup Status – Displays the results of boot-up tests which were run by processors controlled by the C–Bus or SC–Bus I/O ports (**Table 4A–3**). Verifies that each I/O port can receive and transmit messages and that each processor (MOP) controlled by an I/O port can receive commands and transmit responses. (The test results are listed under "Port Alive" and "MOP Alive" on the test report.) If a dash is displayed in the test results, the boot-up test was not applicable. If "inaccessible" is displayed there was a communications failure while attempting to access the MOP's boot-up status. If "stubbed" is displayed, the boot-up test has not been implemented and cannot return valid results. The boot-up status test can also be accessed through USD by entering "RBS" at the USD command line. If a PCB has not

been enabled by the configuration setting, it cannot be checked with Bootup Status.

Table 4A–3. Hardware Bootup Status

PCB Loc	Function (Port Name)	Port	MOP Alive	Bootup Alive Test	Bootup Error Data
A2	M-mode	PASS	PASS	PASS	
A2	Physio	PASS	PASS	PASS	
A3	C Bus Master	PASS	–	–	
A3	SC Bus Master	PASS	–	–	
A4	B/W Scroll Graphic	PASS	PASS	PASS	
A5	Color Scroll Graphic	PASS	PASS	PASS	
A6	Frame Grabber	PASS	PASS	PASS	
A7	Advanced Video	PASS	PASS	PASS	
A7	VCR I/F	PASS	PASS	PASS	
A7	Rear Panel I/F	PASS	PASS	PASS	
A13	Spectral Estimator	PASS	PASS	PASS	
A15	Echo Input	PASS	PASS	PASS	

PCB Loc	Function (Port Name)	Port	MOP Alive	Bootup Alive Test	Bootup Error Data
*A16	Motor Controller	PASS	PASS	PASS	
A17	Color Data Processor	PASS	PASS	PASS	
A18	IF Output	PASS	PASS	PASS	
A21	Front End Controller	PASS	PASS	PASS	
B6	Control Panel I/F	PASS	PASS	PASS	

Hardware Log (HLOG) – Provides a four page list of PCB slots, descriptions, part numbers, and dash numbers. The information is stored on the hard drive and requires the CSR to enter the dash number of each PCB. The information may or may not be current. Information on how to use the hardware log is provided on-screen.

Machine Physio – Displays system voltages (+5, +12, -12, and -5.2 monitored on the CPU) and cardcage temperature on the left video monitor. Cardcage temperatures higher than 42° C will activate a warning message that will appear on the monitor every 10 minutes. Also monitors temperature of the TEE scanheads when connected to

any of the scanhead connectors. Refer to Section 3 for voltage tolerances and adjustment locations.

Reset OB CMOS – Resets OB tables in CMOS and the hard drive.

Reset Up Time – Resets the Display Up Time counter to zero. DO NOT press this button.

Reset Error Log – Resets the error log and error tally. If pressed once, a message appears on the left monitor. Press any other key to abort or press the “Reset Error Log” key to reset.

Trash CMOS – Erases user defined OB tables and user setups stored in CPU CMOS. If the key is pressed, reboot the system to pull OB tables and setups from the hard drive.

4A–9 Engineering Test Panel

Use the ENGINEERING TEST panel (**Figure 4A–16**) to check system configuration and power supply voltages. Refer to the text below for information on these and other functions.

Col Flow Test –Displays the TEST COLOR PANEL (paragraph 4A–9.1).

Debug Button – For engineering use only.

Dop Gain Method – For engineering use only.

Steered CW Test – For engineering use only.

Error Handler – Provides a combined display of error log and error tally information. Logs the system mode, card cage temperature, and scanhead ID’s with each error. The new error tally replaces the old. The new error log is in addition to the old error log, however it is stored on the hard drive and not the non-volatile memory.

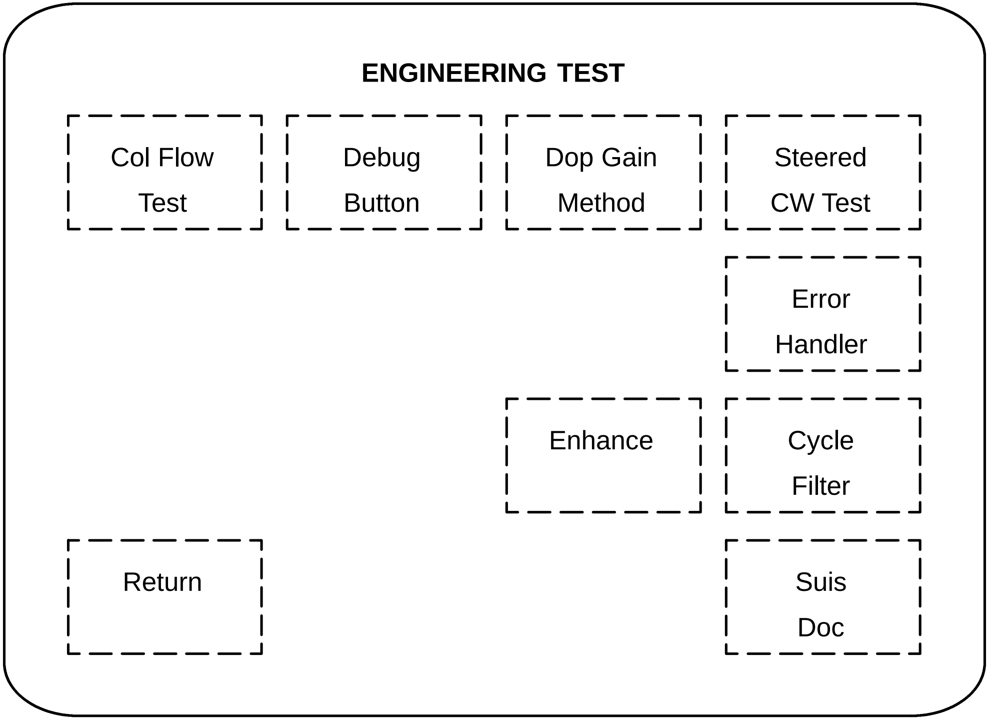


Figure 4A–16. Engineering Test Panel

Enhance – Toggles the Slave IFOM PCB off and on which effectively turns off ESP. Use this key to isolate problems to one IFOM by changing the jumper positions and substituting one PCB for the other. This key will not be displayed on the interactive display unless the system has both IFOM PCBs and is configured for ESP.

Cycle Filter – For engineering use only.

SUIS Document – Generates a text file on the hard drive which describes all of the soft keys available on the system. This function has no diagnostic value.

4A–9.1 Test Color Panel

The TEST COLOR PANEL (**Figure 4A–17**) is used for engineering purposes only.

Sample Volume Size – For engineering use only.

Color Freeze – For engineering use only.

Reject – For engineering use only.

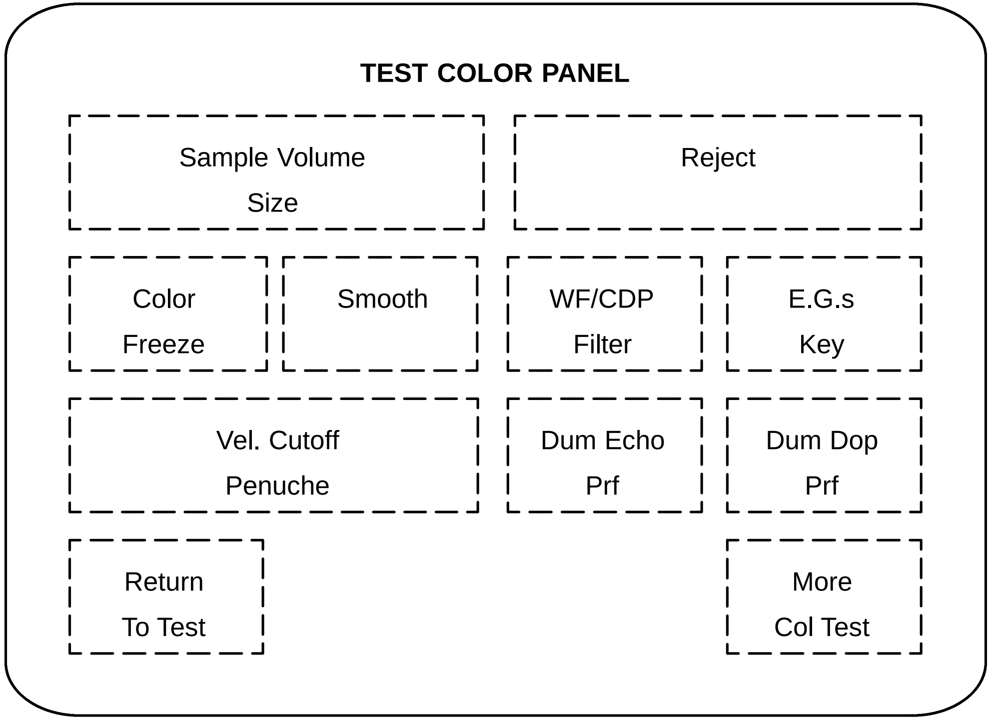


Figure 4A–17. Test Color Panel

Smooth – For engineering use only.

WF/CDP Filter – Displays the WALL/CDP FILTER TEST panel (see page HDI–4A–63).

E.G.s Key – For engineering use only.

Vel. Cutoff Penuche – For engineering use only.

Dum Echo Prf – For engineering use only.

Dum Dop Prf – For engineering use only.

More Col Test – Displays the MORE COLOR TEST PANEL (see page HDI–4A–65).

Wall/CDP Filter Test Panel

All tests on the WALL/CDP FILTER TEST panel (**Figure 4A–18**) are for engineering use only.

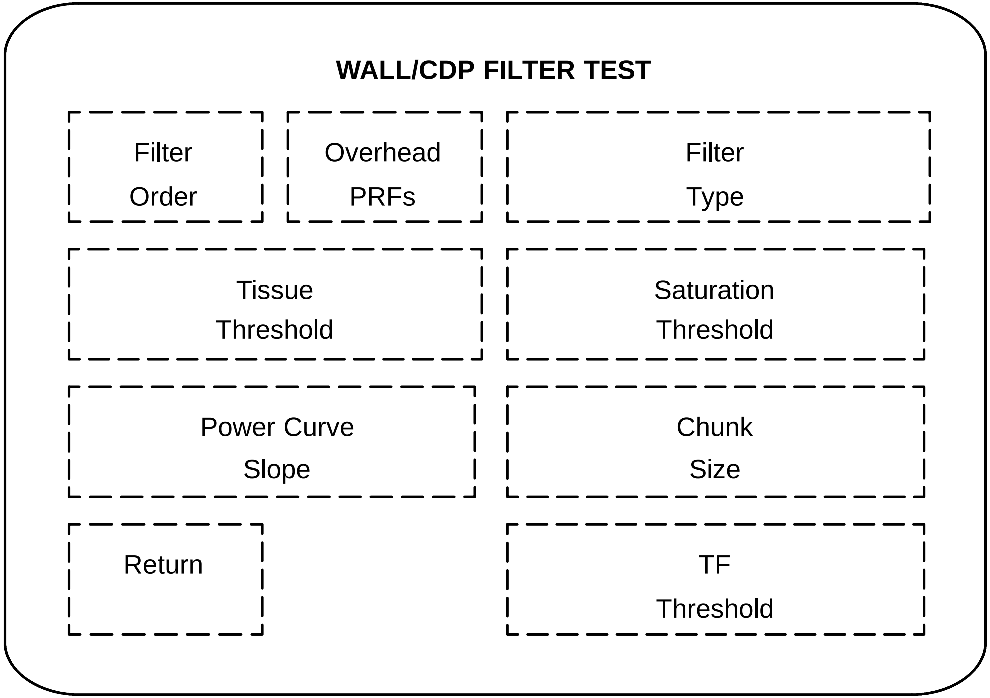


Figure 4A–18. Wall/CDP Filter Test Panel

Filter Order – For engineering use only.

Overhead PRFs – For engineering use only.

Filter Type – For engineering use only.

Tissue Threshold – For engineering use only.

Saturation Threshold – For engineering use only.

Power Curve Slope – For engineering use only.

Chunk Size – For engineering use only.

TF Threshold – For engineering use only.

More Color Test Panel

All tests on the MORE COLOR TEST PANEL (**Figure 4A–19**) are for engineering use only.

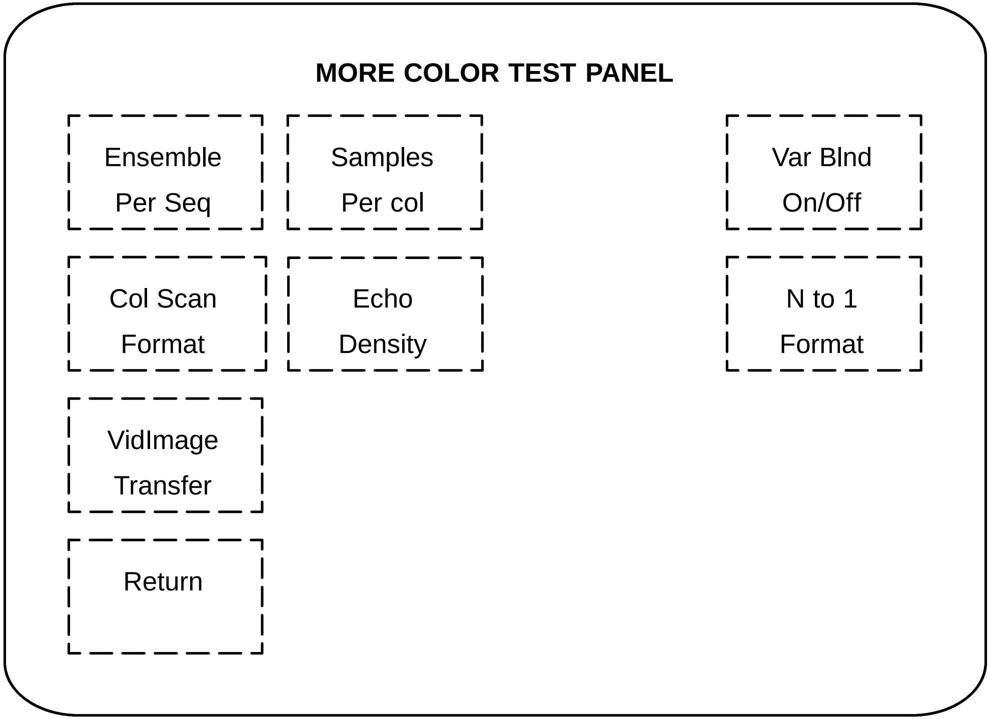


Figure 4A–19. More Color Test Panel

Ensemble Per Seq – For engineering use only.

Samples per Col – For engineering use only.

Var Blnd On/Off – For engineering use only.

Col Scan Format – For engineering use only.

Echo Density – For engineering use only.

N to 1 Format – For engineering use only.

VidImage Transfer – Displays the VIDEO IMAGE DATA TRANSFER panel.

Video Image Data Transfer

The VIDEO IMAGE DATA TRANSFER panel (**Figure 4A–20**) is used for engineering purposes only.

Grab Lft Screen – For engineering use only.

Grab Rt Screen – For engineering use only.

Write Disk – For engineering use only.

Read Disk – For engineering use only.

Display Red Img – For engineering use only.

Display Green Img – For engineering use only.

Display Blue Img – For engineering use only.

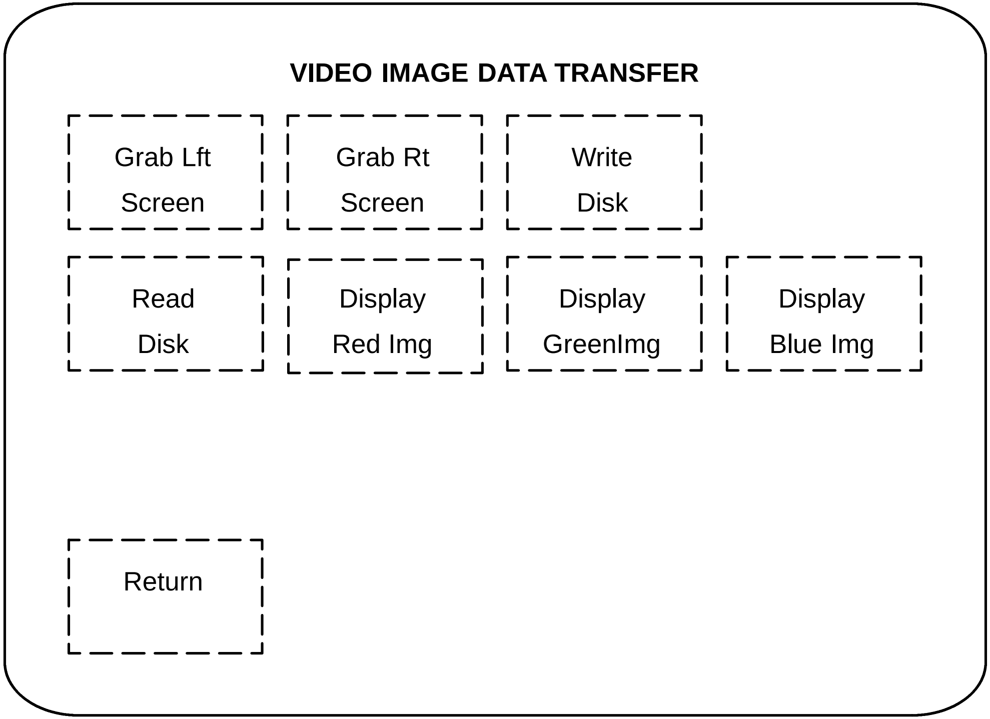


Figure 4A–20. Video Image Data Transfer

4A–10 LED Displays

The PCB LEDs used on the UM-9 HDI system are located on the front edge of the PCBs and may be observed by removing the front card cage cover. All the LEDs are listed for each PCB, however, not all have diagnostic value. The regular LEDs are listed as they appear from top to bottom, and the hex LED displays are listed as they appear chronologically (after system power-up). In the cases where there are two hex LEDs on one PCB, the first number of the number pair in this text refers to the top LED. If a PCB is not listed, there are no LEDs on that particular PCB. Refer to **Table 4A–4** for the PCB locations and **Figure 4A–21** for the LED locations.

NOTE: If the listed sequence of LED illumination is not observed on an individual PCB, there will be other operational symptoms. The information in this paragraph should not be used as the sole criteria when deciding whether to replace a PCB.

NOTE: With the exception of the CPU PCB, newer PCBs will not have the hex LEDs installed.

4A–10.1 Image Memory PCB

The Image Memory PCB contains two red LEDs which flash when read or write commands are acknowledged by the PCB. There is no diagnostic value to these LEDs. The top LED is the Read LED and the bottom LED is the Write LED.

4A–10.2 M-Mode/Physio PCB

The M-Mode/Physio PCB contains two red LEDs which are simultaneously lit momentarily during system power-up. Both are continuously lit again at the end of the power-up sequence (system calibration). They remain on during system operation.

4A–10.3 CPU PCB

The 80386SX CPU PCB contains two hex LEDs and seven regular LEDs. The two hex LEDs provide information about system boot-up status. The displayed information changes as the power-up sequence progresses. The chronologically displayed sequence is as follows:

NOTE: If the following sequence is not observed, the system will not boot, in which case, the PCB should be replaced.

F Displayed momentarily (approx. 1 second) by both LEDs after system power-up. Also, displayed by upper and lower LEDs when a system CPU memory error occurs.

4 Displayed by both LEDs (approx. 3 seconds) during initialization of the CPU.

7 Displayed by both LEDs during program down load from hard disk to the CPU (approx. 30 seconds).

8 Displayed by both LEDs after the CPU boots. Remain displayed unless an error condition occurs, in which case an “F” will be displayed on the lower LED and a “7” will be displayed on the upper LED (hard disk and CPU do not communicate).

The seven LEDs light up in the following sequence from system power-up to system operation:

- Green LED – On when the system first powers up, then turns off. Flashes when hex LEDs read “88”. Refer to hex LEDs above.
- Yellow LED – On when the system first powers up, then turns off.
- Green LED – On at all times.
- Yellow LED – On at all times.
- Yellow LED – On at all times.
- Green LED – On at all times.
- Yellow LED – On at all times.

4A–10.4 Master Scrolling Graphics PCB

The Master Scrolling Graphics PCB contains two red LEDs which are simultaneously lit after system power-up.

4A–10.5 Display Graphics PCB

The Display Graphics PCB contains two red LEDs which are simultaneously lit after system power-up.

4A–10.6 Advanced Video Processor PCB – AVP

The AVP PCB contains four red LEDs which are lit as follows:

- Red LED – Off at all times.
- Red LED – Dimly lit at all times.
- Red LED – Flash as various commands are received by the AVP PCB. The flash sequence depends on which imaging mode the system is in.
- Red LED – Flash as various commands are received by the AVP PCB. The flash sequence depends on which imaging mode the system is in.

These LEDs have no diagnostic value.

4A–10.7 B/W Scan Converter Interface PCB

The B/W Scan Converter Address Generator PCB contains one red LED which remains off during power-up. After the system is calibrated, the LED remains continuously lit. The LED may flash as imaging modes are changed.

Table 4A–4. Card Cage PCB LED Locations

Fig. Ref.[1]	PCB Name
A	2D Acquisition (MFE1)
B	Advanced Digital Data Analyzer (ADDA)
C	Advanced Video Processor (AVP)
D	Channel, Phased/Linear
E	Color Data Processor (CDP)
F	CPU
G	Doppler Acquisition (MFE2)
H	Echo Input Module (EIM)

Fig. Ref.[1]	PCB Name
J	Frame Grabber
K	Front End Controller (FEC)
L	IF Output Module (IFOM)
M	IF Output Module (IFOM Slave/Master)
N	Image Bus Memory
P	M-Mode/Physio
Q	Motor Controller
R	Scan Converter Address Generator, B/W
S	Scan Converter Address Generator, Color
T	Scan Converter Dual Buffer Memory
U	Scan Converter Interface, B/W
V	Scan Converter Interface, Color
W	Scrolling Graphics, B/W
X	Scrolling Graphics, Color
Y	Spectral Estimator

1. Figure reference refers to Figure 4A–21.

4A–10.8 Color Scan Converter Address Generator PCB

The Color Scan Converter Address Generator PCB contains one red LED which remains off during power-up and calibration. It is dimly lit during color 2D and color Doppler imaging modes.

4A–10.9 Advanced Digital Data Analyzer PCB – ADDA

The ADDA PCB contains 2 hex LEDs and 15 regular LEDs. The hex LEDs chronologically display the following:

FF Displayed for approximately 5 seconds upon power-up.

00 Displayed for approximately 30 seconds.

01,10 Displayed continuously. Alternates from “01” to “10”. If the display does not alternate, press DOPPLER button. If the LEDs do not alternately display 01, 10, replace the PCB.

NOTE: Newer versions of the ADDA will not have the hex LEDs.

The regular LEDs are used primarily for engineering debug procedures and have no diagnostic value. The bottom green and yellow LEDs indicate that the Serial Control Interface Processing (SCIP) Bus is functioning. These LEDs should be lit as follows:

- Red LED – Off at all times.
- Red LED – Off at all times.
- Red LED – Off at all times.
- Red LED – On at all times.
- Red LED – Momentarily on at power-up, then off at all times.
- Red LED – On at all times.
- Red LED – Momentarily on at power-up, then off at all times.
- Green LED – On at all times.
- Yellow LED – Momentarily on at power-up, then off at all times.

D Red LED – On at all times.

D Red LED – On at all times.

D Red LED – Off at all times.

D Red LED – Off at all times.

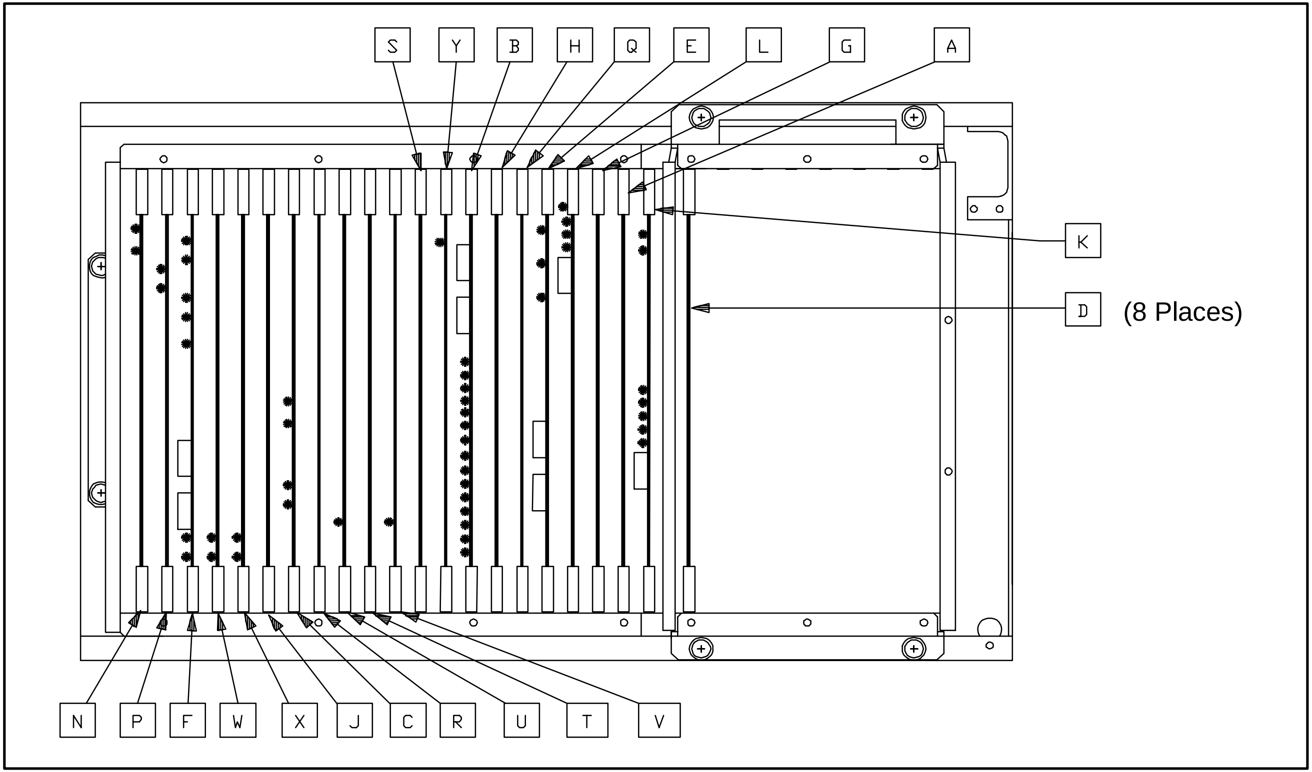
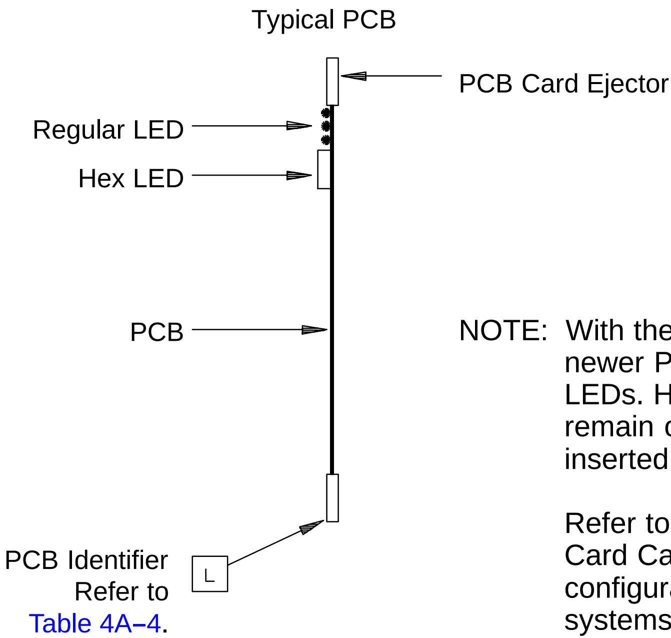


Figure 4A–21. Card Cage LED Locations (1 of 2)

HDI–4A–80



NOTE: With the exception of the CPU PCB, newer PCBs do not have hexadecimal LEDs. However, sockets for the LEDs remain on the PCBs, and LEDs may be inserted for troubleshooting purposes.

Refer to Table 4A–4 for PCB names and Card Cage slot locations for all system configurations. (Old M.B. and new M.B. systems).

10 ES04–A01 03

Figure 4A–21. Card Cage LED Locations (2 of 2)

4A–10.10 Motor Controller PCB

The Motor Controller PCB contains seven LEDs which are all momentarily lit after system power-up. After system power-up, the LEDs are lit as follows:

- Red LED – Usually off. When lit, indicates a system-to-board communication error (usually a transient error).

- Green LED – Flashes during system boot-up and during normal operation. When continuously on or off, indicates the SCIP processor is not functioning and will not allow communication to the system. This problem could also be caused by other boards on the bus. Check USD and the error log for additional symptoms.

- Red LED – Off at all times. When lit, indicates a problem with the PCB or scanhead has been detected (MOP processor fault). If rebooting the system does not clear the error, the PCB or scanhead has a hard fault. Check USD and the error log for additional symptoms.

- Yellow LED – Flashes during normal operation. When on or off continuously, indicates the MOP processor is not functioning, usually caused by a software error. If rebooting the system does not clear the error, the PCB or scanhead has a hard fault. Check USD and the error log for additional symptoms.

- Yellow LED – On steady when the WAM scanhead is selected.

- Yellow LED – Off at all times.

- Yellow LED – Off at all times.

NOTE: If all LEDs are lit, replace the PCB.

4A–10.11 Color Data Processor PCB – CDP

The CDP PCB contains two hex LEDs and three regular LEDs. The hex LEDs indicate the functional status of the CDP. The hex LEDs chronologically display the following:

00 Displayed momentarily at system power-up.

AA Displayed for approximately 20 seconds. The LEDs then go blank.

If any other value is displayed (i.e., FF, 01, 02) the self test has failed and the PCB should be replaced. Also, anytime a CDP command is received, the upper hex LED should display a “7” and the lower hex LED should display a “2”. If these do not appear, replace the PCB.

NOTE: Newer versions of the CDP will not have the hex LEDs.

The green and red LEDs indicate SCIP and MOP (Module Operation Processor) communications. These should be lit as follows:

- Green LED – Flashes continuously after power- up.
- Red LED – Momentarily on at power-up. Then off continuously.
- Red LED – Off until the system enters the self test, then flashes continuously.

4A–10.12 IF Output Module PCB – IFOM

The IFOM PCB contains one hex LED and four regular LEDs. The code displayed on the hex LED changes during system power-up and operation. The following is a list of codes and a description of when they should be displayed:

F,B,D	Displayed during the first few seconds after power-up.
E	Displayed during the “window shades”.
9	Displayed while the ATL logo is displayed on the monitors.
5	Displayed during scanhead calibration.
3	Displayed right before the image is displayed on the monitor.
4	Displayed when the image is displayed and the system is functional.
C	Displayed after color modalities have been enabled.

NOTE: Newer versions of the IFOM will not have the hex LED.

Other codes which may be displayed include:

A	Displayed during initialization.
B	Displayed during boot self test.
C	Displayed when MOP and SCIP communications are initializing.
D	Displayed when IFO is initializing system modalities (2D, M-mode, etc.)
0	Displayed during re-initialization.
1	Displayed when a magnitude error is detected.
2	Displayed when an overflow is detected.
6	Displayed during Cineloop.
7	Displayed when Far Field Improvement (FFI) is enabled.

The regular LEDs should be lit as follows:

- Yellow LED – Momentarily on, then off at all times.
- Red LED – Momentarily on, then off at all times.
- Yellow LED – Momentarily on, then flashes at all times.
- Red LED – Momentarily on, then off at all times.

4A–10.13 Front End Controller PCB – FEC

The FEC PCB contains one hex LED and seven regular LEDs. The hex LED powers up with a “0” and goes blank within seconds. If a “0” through “5” is displayed during power-up a SRAM memory failure is indicated. If a “6” through “B” is displayed a DRAM failure is indicated. After power-up the hex LED codes may indicate the following:

A Indicates a code download failure. Should only be seen when DS4 and DS5 are lit. May indicate a SCIP Bus problem. (Refer to DS numbers in the list of LEDs below.)

B MOP cannot access Dual Port RAM. The SCIP may be locked up and holding scip_busy active.

C If this error is displayed while DS3 is flashing, the MOP has received an error message from the SCIP. Reset the FEC to recover. If this error is displayed while DS3 is off, the Programmable Interval Timer has failed. Replace the FEC.

D MOP has failed the SCIP watchdog requirements. MOP may be executing, but something is not right.

E The SCIP bus may have failed. On some software versions, "E" will be displayed several seconds during power-up and remain until code has been downloaded. This is not an error condition.

F UART has timed out. This error is not fatal and may be seen when the diagnostic port is turned on.

NOTE: Newer versions of the FEC will not have the hex LED.

The upper two regular LEDs are controlled by the Serial Control Interface Processor (SCIP) and the lower five and the hex LED are controlled by the Module Operations Processor (MOP). These should be lit as follows:

D Green or yellow LED (DS2) – Momentarily on at power-up. The LED then flashes. Indicates the SCIP is functioning. (This LED is green on 7500-0570 PCB and yellow on the 7500-0754 PCB.)

D Red or green LED (DS1) – Momentarily on at power-up. Indicates the FEC watchdog has failed. (This LED is red on 7500-0570 PCB and green on 7500-0754 PCB.)

D Green LED (DS3) – Momentarily on at power-up. The LED then flashes. Indicates the MOP is functioning.

D Yellow LED (DS4) – Momentarily on at power-up. The LED flashes during scanhead calibration. Indicates when the MOP receives a Serial Control bus message. It will be on continuously after a code download failure.

- Yellow LED (DS5) – Momentarily on at power-up. It will be on continuously after a code download failure.

- Yellow LED (DS6) – Momentarily on at power-up. Flashes when the front end is scanning and the power monitor circuitry is on. This LED is off when changing system imaging modalities.

- Red LED (DS7) – Momentarily on at power-up. Indicates that the MOP is in the reset state (not executing).

4A–11 General Fault Isolation Procedures

4A–11.1 Centerline Noise Test

Perform this test to determine if the system is generating ECG caused centerline noise.

1. Set the system controls as follows:

TGC	Max
Color Gain	Max
2D Gain	Min
Depth	Max
Output	N/A
CF Size	Max width and height

2. Place an uncoupled phased array scanhead on a stable surface at least 36 inches from the system.

3. Adjust the Color Gain so no color noise pixels are visible. Slowly turn up the gain until the first few color pixels are observed.

4. Connect the ECG cable to the system.

5. Connect the ECG paddles to the test subject as follows:

Black	Left arm, close to the wrist
Red	Left arm, close to the elbow
White	Right arm, between wrist and elbow

6. Couple the scanhead to the test subject's palm.

7. Verify that there is no increase in the number of color noise pixels in the center of the sector. Also, the centerline noise must be limited to one solid or semi-solid radial line of color noise pixels.

8. If there is more than one solid line of color noise pixels, unplug the ECG cable. If the noise is still present, it is caused by other EMI sources and the system passes.

4A–11.2 Color Flash Test

The color flash test tests for random channel noise.

1. Remove the Frame Grabber PCB from the system. (Some systems do not have Frame Grabber.)

2. Calibrate a P3.5 28mm scanhead. If the customer does not have a P3.5, select a Fake P3.5 28mm from the OFE test panel.

3. Press the 2D mode button.

4. Set the system controls as follows:

Map	3
DMD Filter Type	Off (DO)
Persistence	P7
Color Gain	90%

Wall Filter	200 Hz
Depth	10 cm
Focal Depth	8 cm (approx.)
Color Window Size	Max height/width
Mode	Power (from Color Processing Panel)
Frame Rate	Displayed on color monitor (HFR)
Color Write Priority	Max
PRF	4500 Hz

5. Verify the color monitor does not display flashing columns of color.

6. If flashing color columns are present, replace the IFOM PCB.

7. Install the Frame Grabber PCB.

4A–11.3 Color Troubleshooting

Typical problems with color imaging may be difficult to duplicate. Use the following procedure to assist in diagnosis of color related problems.

1. Raise and lower the PRF. If the displayed problem changes, check the FEC, IFOM, and CDP PCBs.

2. Check that 2D images are not distorted. Check the near field reverb when uncoupled. Check the bright point targets for jitter and column shift. If problems are noted, check the Front End.

3. Turn DMD on and off. If the problem changes, check the CDP.

4. Turn Persistence on and off. If the problem changes, check the ADDA.

5. Press FRZ. If the problem appears in Cineloop, check the ADDA. If the problem does not appear in Cineloop, check the SEM, CDP, IFOM, or FEC.

6. Display the color test pattern using the Test Panel. If the problem appears in the test pattern, check the CDP or SEM.

7. Turn on color M-Mode. If the problem does not appear in color M-Mode, then the problem is not likely in the SEM, CDP, IFOM, or Front End.

8. If the problem is seen only with the L10–5, select a fake L10–5 to rule out the scanhead. If the problem is not the scanhead, check the Scanhead Select Daughterboard.

9. If the problem is intermittent, attempt to determine when it happens. Determine if the problem occurs only on cold boot-up or only with certain scanheads.

4A–11.4 Keyboard Commands

The keyboard commands listed in **Table 4A–5** allow the CSR to interrogate the system, forcing it into an operational condition which can be used for fault isolation. Use the following procedure to use the keyboard commands.

1. Power-up the system.

2. Press and hold the CNTRL and SHIFT keys simultaneously. Type the letters “I” and “C” from the keyboard. A small white square appears in the lower left hand corner of the B/W monitor.

3. Enter the desired code from **Table 4A–5** and press ENTER.

4. Use the control panel to enter the appropriate imaging mode appropriate to the code from the table. For example, if the sawtooth wave generator is to be displayed, press the M-Mode button to obtain the horizontal ECG trace or turn on the ECG using the ECG PHYSIO CONTROL panel.

5. Cycle system power or enter the code from the table to turn off the command to exit or to override the control shift IC code.

Table 4A–5. Keyboard Commands

Code	Function[1]
AF010101 AF010100	Loops video through the VCR (01) or routes video through the normal video path (00).
AF060101 AF060100	Switches VCR playback video from an internal VCR (00) to an external VCR (01).
AF070101 AF070100	Switches VCR sync source from SVHS (00) to VHS (01).
A513020010 A513020000	Activates (10) or deactivates (00) a sawtooth wave generator on the M-mode/Physio PCB which simulates an ECG. Use to isolate the ECG Isolation PCB, ECG cable and ECG leads from the rest of the system. Adjust the gain of the sawtooth wave using ECG GAIN on the ECG PHYSIO CONTROL panel.
B131030000C0	Sets EIM PCB gain to maximum. The EIM is used for all modes and transducers (except static CW) and performs many functions which affect image quality.

80450101 80450100	Commands the CPU to unlock (00) the control panel if a system lock-up is control panel related or to lock (01) the control panel to a particular mode, transducer, and other control settings.
805201000	Deactivates automatic FREEZE mode if an operational control is not activated for 10 minutes.

1. The two digits in parentheses refer to the last two digits of the codes in the left hand column.

4A–11.5 Array Channel Test

Weak or dead channels on array scanheads can cause intermittent 2D and color problems. Use this procedure to isolate this problem.

1. Calibrate a C3–40 (real or fake). This sets up a higher far field gain and makes it easier to visualize a Front End problem when doing a Walk 1 on the receive test.

2. Connect a scanhead to the system (preferably a L10–5).

3. Verify only one scanhead is connected. Calibrate the scanhead.

4. Set up the system as follows:

Output	Max
Focal Depth	Any setting less than max
Mode	2D only
Depth	Any setting
TGC	Max

5. Enter the test panel by selecting the SETUP front panel button.

6. Press the blank area next to CHANGE SETUPS four times to enter the PRODUCTION-SERVICE TEST Panel.

7. Select MODULE TEST on the PRODUCTION-SERVICE TEST Panel.

8. Select OFE TEST on the MODULE TEST Panel.

9. Select Walk 1 by pressing Walk 0 1 from the test panel.

10. Select Channel to select the channel, then select Transmit On Channel/Board to enable one channel.

11. Select each of the transmit channels using the Transmit On Channel/Board selection. Verify there is no dropout for each channel, no weak elements, or random noise. Use the information on the right monitor to determine the location of any bad channel boards.

12. If drop-out is detected, plug a scanhead into one of the other connectors. If echo information appears in the area of drop-out when the other scanhead is connected, a relay is likely stuck on the Scanhead Select Module. Drop-out not attributable to the Scanhead Select Module may be caused by a defective channel board or the scanhead. Select a fake scanhead to determine if the scanhead is at fault.

13. Press Enable All Elements to reset the display.

14. Press the Color mode button and verify the following settings:

Steering Angle	Straight down
Col. Window Size Max height and width	
Color Gain	90%
Filter Type	0 (DO on col. display)
Col. Write Priority	Max white level

15. Press RETURN until the PRODUCTION SERVICE TEST Panel is displayed.

16. Repeat steps 7 through 9.

17. Press Receive On Channel Board to enable only one channel.

18. Press RETURN until the PRODUCTION SERVICE TEST Panel is displayed.

19. Press Color Flow Test.

20. Press the REJECT button until the color noise level disappears.

21. Repeat steps 9 through 11 substituting the Receive On Channel/Board.

4A–11.6 Lock-up Fault Isolation

Use this procedure to determine if a lockup is caused by a control panel malfunction or a problem with the rest of the system.

1. While simultaneously pressing CNTRL and SHIFT, type the letters B and A. The following list is displayed on the plasma panel.

   KEYBOARD – Tests alphanumeric keys, spacebar, symbol keys, BACKSPACE, ERASE LINE, and RETURN.

   T.PANEL – Tests all switches on the plasma display.

   FUNCT KEY – Tests ERASE SCRN, PATNT DATA, and ANNOT ON OFF keys on the keyboard.

D BUTTONS – Tests VCR RECORD (L, ATV, and R), PRINT (L or R), FREEZE, FOCAL, TBALL, and all mode buttons.

FOOT SW'S – Tests the footswitches.

TRACKBALL – Tests movement of the trackball. Displays a set of 4 values that change as the trackball is moved.

ROT SW'S – Tests the DEPTH and OUTPUT controls.

SHAFT ENCODER – Tests the gain controls (2D/M, DOPPLER, and COLOR).

SLIDEPOTS – Tests movement of the slidepots.

STATUS – TBA

CAMERA – TBA

2. Check the plasma display to verify no keys are stuck down. Activate each control panel control to determine if each control is functional.

3. If steps 1 and 2 are unsuccessful in isolating the problem to the control panel, disconnect the power cable to the control panel while the system is locked up.

4. Reconnect the power cable and notice if the plasma display counter begins to increment.

5. While simultaneously pressing CNTRL and SHIFT, type the letters B and A. Wait a few seconds and repeat.

6. Press any mode buttons to change the mode the system is in. If the mode changes, the problem was likely caused by the control panel. If the mode does not change, continue with step 8.

7. Before replacing the control panel, check that the problem is not caused by ESD, loose PROMs, faulty switches or loose connections on the control panel.

8. If the preceding steps did not isolate the problem, note whether the system clock stopped at the time of the lockup.

9. If the clock has stopped, remove the PCBs from the card cage one at a time working toward minimum configuration. Refer to **Table 4A–6** for the minimum configuration information.

10. When the PCB causing the lock-up has been removed from the system, the clock will catch up to the actual time.

11. Replace the faulty PCB.

4A–11.7 Non-Booting Systems Fault Isolation

1. Insert the boot disk (P/N 4251-0536-03) into the floppy drive and power up the system.

2. Access USD and type CSALL to verify the checksums of files on the hard drive.

3. Remove the PCBs from the card cage one at a time working toward minimum configuration Refer to **Table 4A–6** for minimum configuration information.

4. Turn the system off and disconnect the hard drive.

5. Install the AVP PCB.

6. Insert the boot disk into drive B and turn the system on. The plasma panel clock stops at 27 seconds, and both CPU LEDs display “8”.

7. Verify that USD can be accessed.

8. If USD can be accessed, check the hard drive and drive cable. If USD cannot be accessed the problem may be caused by the CPU or 2D Acquisition (MFE1).

9. To determine the last 100 keystrokes entered into the system simultaneously press CNTRL and SHIFT and type the letters I and N. The information is in a five page log.

10. To view the other pages press CNTRL, SHIFT, I, and N again.

11. To clear, simultaneously press CNTRL and SHIFT and type the letters R and N.

12. To erase the screen, press M-mode or a scrolling Doppler mode button. Press 2D to return to 2D display.

4A–12 Minimum Configuration

Table 4A–6 lists minimum PCB configurations, feature by feature, for the UM-9 HDI. To obtain the minimum configuration for a particular feature, find the feature in **Table 4A–6** and remove all non-checked PCBs from the system card cage.

4A–13 Cooling Fan Troubleshooting

Cooling fan troubleshooting procedure is contained in **Figure 4A–22.** Also refer to the fan power distribution wiring diagram and DC power distribution diagrams in Section 1B.

4A–14 Scanhead/System Interface Data

Table 4A–7 lists which scanhead element is connected to which connector pin, and which channel board, device, channel, and element in the system are responsible for which transducer element.

Table 4A–6. Minimum Configuration

PCB Name	A	B	C	D	E	F	G	H	I		
2D Acquisition MFE1 [5]	D	D	D	D	D	D	D	D	D		
Advanced Digital Data Analyzer						D	D		D		
Advanced Frame Grabber					D	D		D			
Advanced Video Processor		D	D	D	D	D	D	D	D		
Channel PCBs (A22 – A29)				D	D	D	D	D	D		
Color Data Processor							D	D			
CPU	D	D	D	D	D	D	D	D	D		
Doppler Acquisition MFE2									D		
Echo Input Module [4]				D	D			D[4]			

PCB Name	A	B	C	D	E	F	G	H	I		
Frame Grabber											
Front End Controller [5]			D	D	D	D	D	D	D		
IF Output				D	D	D	D	D	D		
Image Memory		D	D	D	D	D	D	D	D		
Motor Controller			D	D	D	D					
M-Mode/Physio Processor [4]					D	D		D [4]	D		
S.C. Address Generator (B/W)				D							
S.C. Address Generator (Color)							D				
S.C. Dual Buffer Memory				D			D				
S.C. Interface (B/W)				D							
S.C. Interface (Color)							D				
Scrolling Graphics, B/W (Master) [3]					D	D		D	D		
Scrolling Graphics, Color (Slave) [3]						D		D	D		
Scrolling Graphics Display [3]					D	D		D	D		
Spectral Estimator							D	D			
S/H Select			D	D	D	D	D	D	D		
S/H Select Daughterboard			D	D	D	D	D	D	D		

Column	Mode/Function	Column	Mode/Function
A	System Initialization[1]	F	Spectral Doppler
B	Video[2]	G	2D Color
C	Scanhead Identification	H	Color M-mode[4]
D	2D Grayscale	I	CW/ST CW
E	M-mode Grayscale		

1. CPU LEDs will display “88” to show the system has booted.

2. Real-time graphics, etc.

3. Scrolling graphics functions may be accomplished with both Scrolling Graphics PCBs (B/W and Color) or the Scrolling Graphics Display PCB.

4. Color M-mode does not require M-mode/Physio PCB or Echo Input Module PCB if the system has the B/W and color scrolling graphics PCBs installed. If the system has a Scrolling Graphics Display PCB, the M-mode/Physio PCB and Echo Input Module PCB are required for minimum configuration.

5. On systems without the MFE1, the system obtains the 120 MHz sytem clock from the Front End Controller. In this case the Front End Controller row is filled across the table and the MFE1 row is empty.

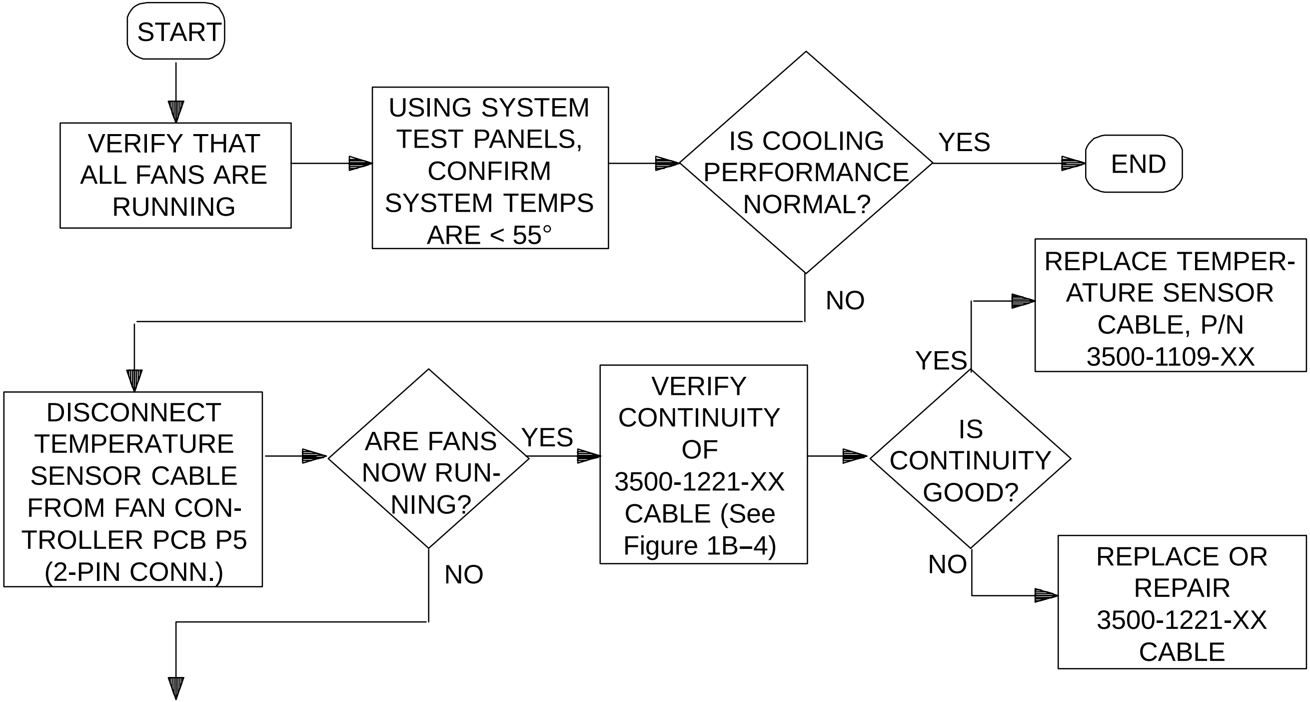


Figure 4A–22. Cooling Fan Troubleshooting Flow Diagram (1 of 2)

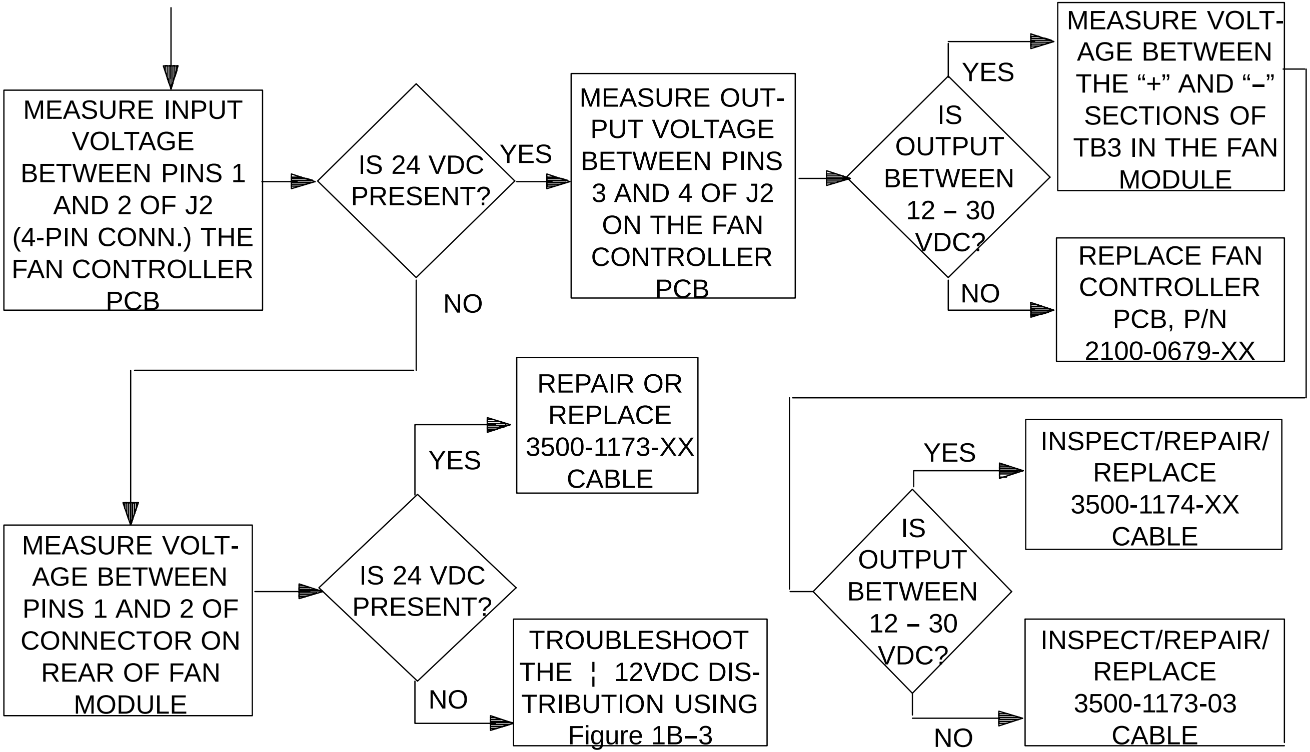


Figure 4A–22. Cooling Fan Troubleshooting Flow Diagram (2 of 2)

Table 4A–7. Scanhead/System Interface Data

Xdr Element	Connector Pin	Channel Board	Device	Channel	Element	A6-3 Element	Notes
1	U5	0	0	0	1	7	
2	U4	0	1	0	1	7	
3	U3	0	2	0	1	7	
4	U2	0	3	0	1	7	
5	V2	1	3	0	1		
6	V3	1	2	0	1		
7	V4	1	1	0	1		
8	V5	1	0	0	1		
9	W5	2	0	0	1	5	
10	W4	2	1	0	1	5	
11	W3	2	2	0	1	5	
12	W2	2	3	0	1	5	
13	X2	3	3	0	1		
14	X3	3	2	0	1		

Xdr Element	Connector Pin	Channel Board	Device	Channel	Element	A6-3 Element	Notes
15	X4	3	1	0	1		
16	X5	3	0	0	1		
17	Y5	4	0	0	1	3	
18	Y4	4	1	0	1	3	
19	Y3	4	2	0	1	3	
20	Y2	4	3	0	1	3	
21	Z2	5	3	0	1		
22	Z3	5	2	0	1		
23	Z4	5	1	0	1		
24	Z5	5	0	0	1		
25	a5	6	0	0	1	1	
26	a4	6	1	0	1	1	
27	a3	6	2	0	1	1	
28	a2	6	3	0	1	1	
29	b2	7	3	0	1		
30	b3	7	2	0	1		

Xdr Element	Connector Pin	Channel Board	Device	Channel	Element	A6-3 Element	Notes
31	b4	7	1	0	1		
32	b5	7	0	0	1		
33	b6	7	0	1	1		
34	b7	7	1	1	1		
35	b8	7	2	1	1		
36	b9	7	3	1	1		
37	a9	6	3	1	1	1	
38	a8	6	2	1	1	1	
39	a7	6	1	1	1	1	
40	a6	6	0	1	1	1	
41	Z6	5	0	1	1		
42	Z7	5	1	1	1		
43	Z8	5	2	1	1		
44	Z9	5	3	1	1		
45	Y9	4	3	1	1	3	
46	Y8	4	2	1	1	3	

Xdr Element	Connector Pin	Channel Board	Device	Channel	Element	A6-3 Element	Notes
47	Y7	4	1	1	1	3	
48	Y6	4	0	1	1	3	
49	X6	3	0	1	1		
50	X7	3	1	1	1		
51	X8	3	2	1	1		
52	X9	3	3	1	1		
53	W9	2	3	1	1	5	
54	W8	2	2	1	1	5	
55	W7	2	1	1	1	5	
56	W6	2	0	1	1	5	
57	V6	1	0	1	1		
58	V7	1	1	1	1		
59	V8	1	2	1	1		
60	V9	1	3	1	1		
61	U9	0	3	1	1	7	
62	U8	0	2	1	1	7	

HDI–4A–118

Xdr Element	Connector Pin	Channel Board	Device	Channel	Element	A6-3 Element	Notes
63	U7	0	1	1	1	7	
64	U6	0	0	1	1	7	
65	T5	0	0	0	0		
66	T4	0	1	0	0		
67	T3	0	2	0	0		
68	T2	0	3	0	0		
69	S2	1	3	0	0	2	
70	S3	1	2	0	0	2	
71	S4	1	1	0	0	2	
72	S5	1	0	0	0	2	
73	R5	2	0	0	0		
74	R4	2	1	0	0		
75	R3	2	2	0	0		
76	R2	2	3	0	0		
77	P2	3	3	0	0	4	
78	P3	3	2	0	0	4	

Xdr Element	Connector Pin	Channel Board	Device	Channel	Element	A6-3 Element	Notes
79	P4	3	1	0	0	4	
80	P5	3	0	0	0	4	
81	N5	4	0	0	0		
82	N4	4	1	0	0		
83	N3	4	2	0	0		
84	N2	4	3	0	0		
85	M2	5	3	0	0	6	
86	M3	5	2	0	0	6	
87	M4	5	1	0	0	6	
88	M5	5	0	0	0	6	
89	L5	6	0	0	0		
90	L4	6	1	0	0		
91	L3	6	2	0	0		
92	L2	6	3	0	0		
93	K2	7	3	0	0	8	
94	K3	7	2	0	0	8	

Xdr Element	Connector Pin	Channel Board	Device	Channel	Element	A6-3 Element	Notes
95	K4	7	1	0	0	8	
96	K5	7	0	0	0	8	
97	K6	7	0	1	0	8	
98	K7	7	1	1	0	8	
99	K8	7	2	1	0	8	
100	K9	7	3	1	0	8	
101	L9	6	3	1	0		
102	L8	6	2	1	0		
103	L7	6	1	1	0		
104	L6	6	0	1	0		
105	M6	5	0	1	0	6	
106	M7	5	1	1	0	6	
107	M8	5	2	1	0	6	
108	M9	5	3	1	0	6	
109	N9	4	3	1	0		
110	N8	4	2	1	0		

Xdr Element	Connector Pin	Channel Board	Device	Channel	Element	A6-3 Element	Notes
111	N7	4	1	1	0		
112	N6	4	0	1	0		
113	P6	3	0	1	0	4	
114	P7	3	1	1	0	4	
115	P8	3	2	1	0	4	
116	P9	3	3	1	0	4	
117	R9	2	3	1	0		
118	R8	2	2	1	0		
119	R7	2	1	1	0		
120	R6	2	0	1	0		
121	S6	1	0	1	0	2	
122	S7	1	1	1	0	2	
123	S8	1	2	1	0	2	
124	S9	1	3	1	0	2	
125	T9	0	3	1	0		
126	T8	0	2	1	0		

Xdr Element	Connector Pin	Channel Board	Device	Channel	Element	A6-3 Element	Notes
127	T7	0	1	1	0		
128	T6	0	0	1	0		

5A Configuration Usage Rules

5A–1 Introduction

This section contains general information on how to verify system software and hardware configurations in the UM-9 HDI system. It contains information on how to use the Software Replacement Matrix, PCB Replacement Tables, PROM Replacement Tables, PCB Silhouettes, and Scanhead Compatibility Matrix.

5A–2 Compatibility

A number of PCBs in the UM-9 HDI system require operating software PROMs (firmware). The 80386SX CPU PCB software determines the overall system software level (e.g., 8.36). The software on other PCBs will never be at a level higher than that of the CPU and can be at a lower level.

NOTE: If unsure of software or PCB compatibility, refer to the Hardware Configuration instructions and order PCB (and software, if required) that is appropriate for the system software level.

5A–3 Software Configuration

Software configuration involves verification that the hard drive part number is consistent with the intended system software level and language version.

5A–3.1 Software Replacement Matrix (Figure 5A–1)

1. **Drive**

    a. **Name**: The language version of the software on the hard drive.

    b. **Part No**: The part number of the hard drive with the software installed.

2. **Replacement Levels**: The manufacturing software build identification number. The codes that appear in the rows adjacent to a part number indicate the relationship between a specific revision hard drive and a specific software build. A legend explaining the different replacement codes is provided prior to the information for the individual PCBs in Section 5C.

3. **Notes**: Reserved for additional information.

Drive			Replacement Levels					Notes
Name	Part No.							
1a	1b				2			3

Figure 5A–1.   Sample Software Replacement Matrix

5A–4 Hardware Configuration

Hardware configuration involves verification that the PCBs and PROMs are consistent with the intended software level and that the jumper positions are correct for the PCB rev level. The hardware information in Section 5C is formatted so that all the information for each PCB is contained on one page or facing pages (where possible). Use of the PCB Replacement Tables, PROM Replacement Tables, and PCB Silhouettes are explained below.

NOTE: If the compatibility of a PCB is in question, order a replacement PCB and software listed for the system software level.

5A–4.1 PCB Replacement Tables (Figure 5A–2)

1. **PCB**

   a. **Part No**: The base ATL part number of the PCB. Only part numbers stocked and shipped by ATL (Bothell) are included.

   b. **Dash No**: The revision number of the PCB. Only revisions stocked and shipped by ATL (Bothell) are included.

2. **Replacement Levels**: The manufacturing software build identification number. The codes that appear in the rows adjacent to a part number show the relationship between a specific PCB revision and a specific software build. A legend explaining the different replacement codes is provided prior to the information for the individual PCBs in Section 5C.

3. **Features**: System features that may or may not be compatible with a specific PCB revision. A legend explaining the different replacement codes is provided prior to the information for the

individual PCBs in Section 5C. Non-compatibility is indicated by an N or with no entry.

4. **Notes**: Reserved for additional information.

PCB		**Replacement Levels**					**Features**			
Part No.										**Notes**
1a	1b			2				3		4

Figure 5A–2. Sample PCB Replacement Table

5A–4.2 PROM Replacement Tables (Figure 5A–3)

1. **PCB**

   a. **Part No**: The base part number of the PCB. Only part numbers stocked and shipped by ATL (Bothell) are included.

   b. **Dash No**: The revision number of the PCB. Only revisions stocked and shipped by ATL (Bothell) are included.

2. **PROM KIT**

   a. **Part No**: The base part number of the PROM. Only part numbers stocked and shipped by ATL (Bothell) are included.

   b. **Dash No**: The revision number of the PROM. Only revisions stocked and shipped by ATL (Bothell) are included.

3. **Replacement Levels**: The manufacturing software build identification number. The replacement level codes that appear in the rows adjacent to a part number show the relationship between a specific PCB dash number and a specific manufacturing software build. A legend explaining the different replacement codes is provided prior to the information for the individual PCBs in Section 5C.

4. **Location, P/N, Dash**

   a. **Location**: The integrated circuit (IC) socket designation on the PCB.

   b. **P/N**: The base part number of the PROM. Only part numbers stocked and shipped by ATL (Bothell) are included.

   c. **Dash**: The revision number of the PROM. Only revisions stocked and shipped by ATL (Bothell) are included.

PCB		PROM Kit		Replacement Levels							
Part No.		Part No.							Location, P/N, Dash		
1a	1b	2a	2b			3			4a	4b	4c

Figure 5A–3. Sample PROM Replacement Table

PCB Figures

The PCB figures illustrate jumper positions, dipswitch settings, and PROM locations. All non-illustrated jumpers are considered open or not installed. Jumpers that are shown installed may be physically connected with a jumper header or hard wired as shown.

Dipswitch settings are illustrated with the “o” indicating the depressed side of the switch. In other words, press on the side of the switch indicated by the “o” to set that switch position.

The PROM locations illustrated in the figures are limited to the PROMs that are contained in the PROM kits or the individual PROMs listed in the PROM tables.

How to Use the Tables

When referring to the procedure below and using the tables in Section 5C, “R” designates the stocked replacement level for PCBs (the PCB to order); “A” designates “Alternate”, or functional equivalent (may be sent by factory as a substitute); “L” requires exact replacement due to physical, electrical or feature issues. PCBs are reworked and stocked at the highest rev level possible for that “build”. Occasionally, PCB builds are revised to reduce “cuts and jumps” (a re-lay-out). The new dash level remains a functional equivalent to the parent PCB and, as such, may be listed in the matrix as an alternate (“A”). This revision (“A”) is listed only to authenticate compatibility of the PCB in the event one is shipped as a substitute for a listed replacement PCB; it should not be ordered by field personnel.

1. Note the configuration, system features, and software build.

2. Troubleshoot the system to the PCB or module level.

3. Remove the suspect PCB or module and determine the part and dash numbers.

NOTE: Do not return suspected bad parts at this time. Retain parts in their original condition for (1) later failure analysis and (2) the possibility that their reinstallation may be necessary for further troubleshooting.

4. Use the PCB tables to determine the replacement PCB part number and dash number. The correct replacement level is denoted by an “R” or an “L” in the replacement level column for the software build. Pay special attention to the feature compatibility and the notes at the bottom of the table.

5. Use the PROM tables to determine which PROM kit or individual PROMs satisfy the software build and PCB replacement requirements.

6. When ordering PCBs and PROMs:

   a. Provide the following information to assist the factory in determining if an alternate part is acceptable:

      - Product Configuration Code
      - Software build (8.36; 8.73C; etc.)
      - Replacement PCB part number from table (specify if a like-for-like [“L”] part is required)
      - Replacement PROM kit or individual PROM part numbers
      - Feature compatibility requirements

   b. Report the failure category. This information is used for the dead-on-arrival (DOA) and the early-life-failure (ELF) program. Identify the failure category as P1, P2, or P3.

      - A P1 failure applies to any part or assembly that fails within 30 days of being shipped by ATL Manufacturing.

- A P2 failure applies to any part or assembly that fails after 30 days, and that failure results in a “doctor down” condition.
- A P3 failure applies to any part or assembly that fails after 30 days, but that failure does not result in a “doctor down” condition.

7. Use the PCB tables to verify the correct PCB was received for the system. Call Technical Support if the replacement codes are incorrect or if the feature compatibility is unclear.

NOTE: If you ordered and received PROMs and the PCB was received with PROMs installed, verify that the installed PROMs are correct. If not correct, replace them with the separately ordered PROMs. Return all unused PROMs.

8. Refer to the PROM tables and PCB silhouettes and install the PROMS in the PCB.

CAUTION

Ensure that all PROMs are installed carefully and correctly:

- **Observe anti-static precautions.**
- **Ensure that the IC part number label is properly attached (Figure 5A–4).**
- **Ensure that pin 1 on the IC matches pin 1 on the socket. Pin 1 is identified by a notch in the body of the IC at the top middle or a dot or dimple adjacent to pin 1.**
- **Ensure that PROM pins are straight, spaced properly, and aligned with the socket prior to insertion into the socket.**
- **After insertion, ensure that all pins are in their sockets and that the IC is fully seated.**

9. Use the PCB silhouettes to verify all jumper positions.

10. Install the PCB into the correct card cage slot.

11. Verify that the replacement parts correct the system failure.

NOTE: If new parts did not correct the problem and are being returned to the factory, label them “used for troubleshooting”.

12. Return all DOA and unused parts listed on the Return Control Authorization (RCA) for the specific order and ensure that the serial number is correct.

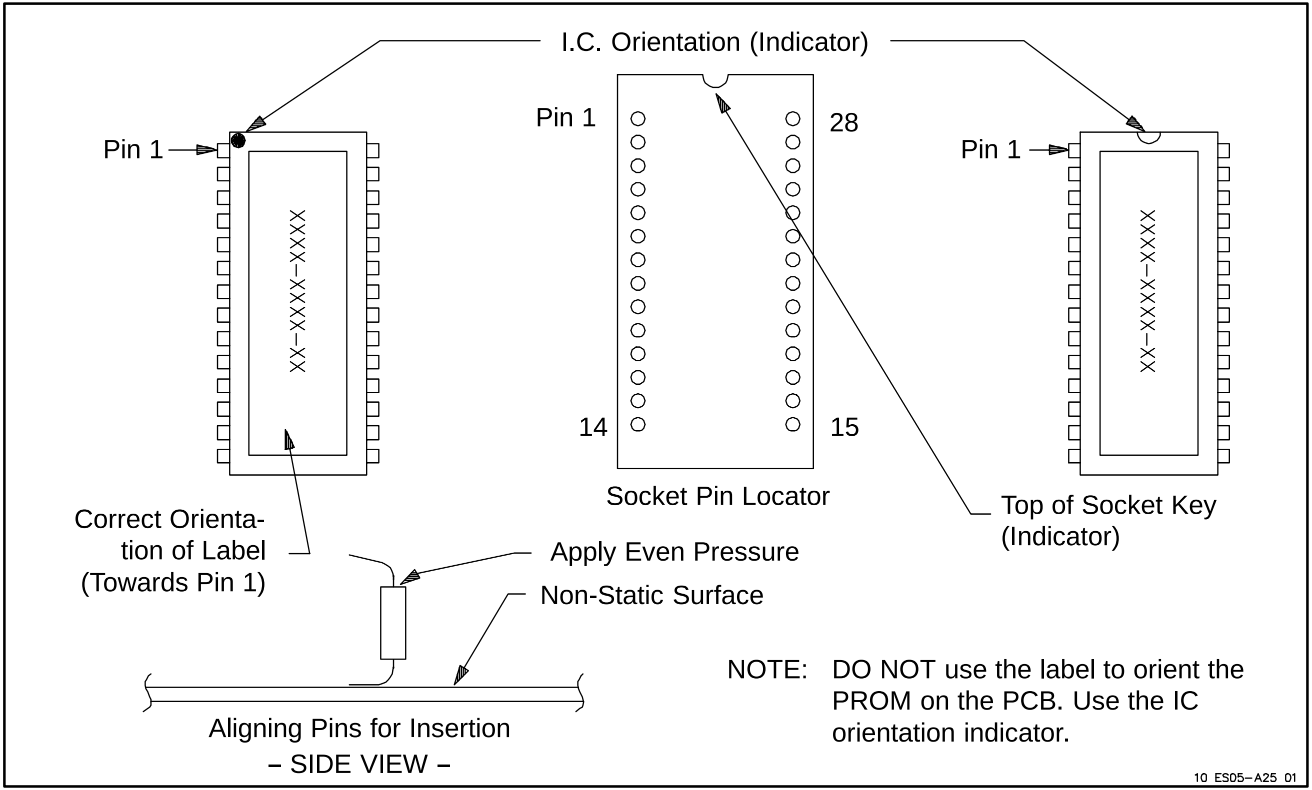


Figure 5A–4. IC Orientation

5A–5 Scanhead Compatibility Matrix (Figure 5A–5)

1. **Scanhead Type/Scanhead Name:** The type or series of scanhead is listed in bold print at the beginning of each category. Categories include: phased arrays, linear arrays, curved arrays, wide aperture annular arrays, and static CW.

   Under each scanhead type is listed the common name for the scanhead.

2. **Part No:** The part number of the scanhead. Only those part numbers stocked and shipped by ATL Customer Service are included.

3. **Bkwd Comp:** Backward compatibility. This column indicates which previous revision scanheads can be replaced by the current revision.

4. **Fwd Comp:** Forward compatibility. This column indicates if a specific dash level can replace a higher revision scanhead.

5. **ESP Avail:** Forward compatibility. This column indicates if a specific dash level can replace a higher revision scanhead.

6. **Hardware Notes:** Reserved for additional comments, including detailed backward compatibility information.

7. **S/W Comp:** Software compatibility. The coding in this column indicates lowest software revision level tested and required.

Scanhead Type/ Scanhead Name	Part No.		Bkwd. Comp.	Fwd. Comp.	ESP Avail.	Hardware Notes	S/W Comp.
1	2		3	4	5	6	7

Figure 5A–5. Scanhead Compatibility Matrix

5B Software History/Configuration

5B–1 Change Summary

The change summary comprises operation, application, and technical issues. It contains a description of recent changes to the system. Included are lists of new features, problems that have been corrected since the last software revision, and existing problems.

The change summary explains issues that are too involved for explanation in the tables or matrices of Section 5C. For example, replacement levels of PCBs and PROMS for the Ultramark 9 HDI Ultrasound System may depend upon the feature set of the system.

NOTE: All systems in the field have been baselined to software versions 10.43 or higher. Software versions below 10.43 have been removed from the configuration matrices of this section.

8.35

Software released June 5, 1991 for first customer deliveries.

8.36

The release of 8.36 software occurred on August 14, 1991. All UM-9 HDI systems in the field have been baselined with 8.36 software. It includes the following:

- Adds repeat function to the control panel keys.
- Release of a new P3.5 28mm phased array scanhead (P/N 4000-0279-01) that is only compatible with 8.36 and higher software. The old scanhead is compatible with 8.32 through 8.35 software. The new scanhead is clinically the same as the old scanhead and was available September 16, 1991.

Problems Corrected

- AVP PCB firmware was corrected to fix slow TGC and graphics.
- Reduces the occurrence of power monitor defaults, particularly when the L10-5 scanhead is used.
- Adds an 80387 math co-processor to speed up calculation of color transitions and focal zone changes.
- Corrects for color slow-down during triple mode.

8.73C

The release of 8.73C software occurred on February 13, 1992. This release was to support a limited number of domestic and international sales demos and beta test systems. The release included the following features:

- Adds the A6–3 Mercury Wide Aperture Annular scanhead (WAM).
- Adds biopsy guides for the A6–3, C3.5 40R, C3.5 76R, C5 40R, and L5 38mm scanheads.

D Enhances image quality on the C3.5 40R scanhead.

D Improves 2D grayscale curves 2, 3, 4, and 8.

D Allows 2D distance measurements with live images.

D Adds “Breast” as a user setup selection under the “Radio” User Setups.

D Incorporates additional fixes for power monitor faults.

D Adds Hidden Digital ECG Trigger and Image Gate Feature for compatibility with the ImageVue™ Workstation. (Hidden digital is updated with each R-wave whenever ECG is turned on and the triggers are not being used for other things.)

D Adds enhanced diagnostics.

D Corrects problems in running the “Channel Noise Tests” with the L10-5 scanhead.

8.75

The release of 8.75 software occurred on March 27, 1992. This release was to support a limited number of non-revenue release systems and is planned as the first customer delivery software version to support the WAM scanhead. The release included the following features:

- Improvements to the penetration test.
- Added ranges to configuration items so that, if unexpected values have been entered, the system will boot-up into an operational status.

Problems Corrected

- L10-5 biopsy guide cursor now displays the proper depth.
- WAM (and WAA) biopsy guides now track the needle placement more efficiently.
- Save/Recall works in sync with the Frame Grabber.

- Sony 5000 touch panel header has been changed to INTERNAL COLOR PAGE PRINTER.
- Minor bug in return boot-up status from M-mode/Physio PCB has been corrected.
- Simultaneous Doppler set to a PRF of 8333 Hz will now scroll without noise appearing on the display.

8.75A

The release of 8.75A software occurred on May 14, 1992. This release was to correct “radial” noise and “clutter” noise with the P7 8mm scanhead when used at 60 dB dynamic range. No other features or capabilities of the software were affected. Refer to the Operating Notes for 8.75 software (P/N 4707-0013-05) for the known problems.

8.78

The release of 8.78 software occurred on May 11, 1992. This release was to support a limited number of domestic and international sales demos and beta test systems. This software was not released in an FCD (first customer delivery) version. The release included the following features:

- Adds the C9-5 ICT scanhead and biopsy guide.
- Adds the UM-9 HDI Grayscale system.
- Adds French and German translations of system software.
- Sets the ICT start-up defaults as follows: Post-processing curve to 5; Doppler velocity range to 1500; color map to 2; depth to 3.9 cm and 4 focal zones.
- New AP & I values for the C3 40 mm.
- Improved IVT image quality.

8.79

The release of 8.79 software occurred on June 5, 1992. This release corrects a lock-up problem with 8.78 software and is the FCD release of all 8.78 features.

8.79A

The release of 8.79A software occurred on October 21, 1992. This software was released to correct disconnect problems with the L10-5 scanhead when the FRZ button was repeatedly pressed. A limited number of systems were shipped and all are to be baselined to 8.79B on a next call basis. There were no operating notes generated.

8.79B

The release of 8.79B software occurred on November 2, 1992. This release corrects a problem with Power Monitor faults introduced with 8.79A software.

10.38 (Level 3)

The release of 10.38 software occurred on October 19, 1992. This release was to support a limited number of non-revenue release (demo) systems. The release includes the following:

- Adds the P3-2, 20 mm, 64 element, phased array scanhead.
- Adds the D2 CW (2.25 MHz), D5 CW (5.0 MHz) and D10 CW (10 MHz) static CW transducers.
- Adds the D2 TC (2.0 MHz) static transducer for transcranial Doppler applications (CW and PW).
- Adds real time Doppler analysis (High Q™ Automatic Doppler Analysis).
- Adds steered CW (P3-2, 20mm).
- The Cardiology preset has been changed to DIFFICULT.
- High Q Option is not allowed in Cardiology (defined with patient data entry market type selection).

- Maximum triple mode PRF is 6250 with DMD on and 8333 with DMD off.
- Maximum 2D color flow PRF is 12000 with DMD on and 18000 with DMD off.
- User defined OB tables are stored on the hard drive.

10.43B

The release of 10.43B software occurred on December 9, 1992. The release includes and is the production release of all the features of 10.38 software. (Refer to the above paragraph on 10.38 software for features of 10.43B.)

Problems Corrected

- Doppler velocity scale now automatically resets to the correct level when a new application preset is selected from the application specific menu.
- Zoomed M-mode distance measurement inaccuracies when scrolling M-mode display is stopped using the M button instead of the FRZ button.
- Replaces the on-screen displayed ATL logo with the new logo (must have the 3500-1200-03/-04 or 3500-1201-03/-04 AVP PCBs).

Known Problems

Refer to the Ultramark 9 HDI Operating Notes, May 20, 1994 (P/N 4707-0013-19 Rev B) for the known problems with 10.43B/10.43C software.

10.43C

The release of 10.43C occurred on April 14, 1993. The release was primarily to remove Bi-plane TEE capability from 10.43B software and to release firmware for the new IF Output Module PCB (7500-0783-07). Software level 10.43C will be rolled into the baseline upgrades. Bi-plane TEE capability will be added to the system with a future release. Ultramark 9 HDI systems shipped from the factory after 4/28/93 will have the new IFOM PCB installed.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes, May 20, 1994 (P/N 4707-0013-19 Rev B) for the known problems with 10.43C software.

10.44A

The release of 10.44A occurred on May 25, 1993. The release includes the following:

- Adds Biplane TEE capability. This capability is supported with the old (7500-0592-XX) and new (7500-0783-XX) IFOM PCBs.
- Adds support for a future Channel PCB.
- English, French, and German software versions.
- AVP PROM to fix “slow TGC.” AVP PROM also corrects SVHS VCR problem.
- CPU, MMC, IFOM, and FEC SCIP PROMs to correct noise in 2D image and lines in the color box.
- Scrolling and Slave Graphics PROMs to adjust the vertical alignment of the graphics in PAL video format to match AVP alignment.
- ADDA PROM.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes, May 20, 1994 (P/N 4707-0013-20 Rev B) for the known problems with 10.44A software.

10.44C

The release of 10.44C occurred on September 2, 1993. The release fixes problems with VCR operation on Level 3 systems that were fixed on Level 4 systems with 12.06A software. The features of the release include:

- The system will display the VCR status correctly when the user attempts to back-space the tape during pause.
- The VCR control keys continue to function when the print key is pressed during playback.
- English, French and German language versions.

The AVP PROM is being sent to individual customers on an as needed basis. There are no upgrade kits for this software level because the AVP PROM is included in the Level 5 baseline (13.18A software).

Known Problems

Refer to the Ultramark 9 HDI Operating Notes, May 20, 1994 (P/N 4707-0013-20 Rev B) for the known problems with 10.44C software. (The operating notes for 10.44C supersede those for 10.44A).

12.04C (Level 4)

The release of 12.04C occurred on April 16, 1993. The release was to support a limited number of non-revenue release (demo) systems with the Level 4 feature set. The release includes the following:

- Replaces the C5–40R with the C7–4 40R, curved array scan-head.

- Extended Signal Processing (ESP) on the A6–3, P3–2, L10–5, C9–5 scanheads, and the new C7–4 scanhead. ESP replaces the existing IF Output Module (IFOM) PCB with two new IFOM PCBs. ESP is used in Vascular, Obstetrics, and Radiology applications; however, it is not available for transcranial Doppler and Cardiology applications with this release.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes, April 19, 1993 (P/N 4707-0013-10 Rev B) for the known problems with 12.04C software.

12.06

The release of 12.06 software occurred on May 19, 1993. The release was to support RFD of the Level 4 (ESP – Extended Signal Processing) feature set. ESP systems will be manufactured and sold concurrently with Level 3 systems. The feature set includes the features listed above for 12.04C software and the following:

- Preset changes.
- Vascular specific setups for L10–5.
- New default number of focal zones for L10–5, C7–4, and C9–5 scanheads.
- New L7–4 scanhead which includes vascular specific setups.
- English, French, and German software versions.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes, May 26, 1994 (P/N 4707-0013-21 Rev C) for the known problems with 12.06 software.

12.06A

The release of 12.06A software occurred on July 30, 1993. The software supports release of the 7500-0755-XX Channel PCB and replaces an AVP PROM which corrected a number of problems with VCR operation.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes, May 26, 1994 (P/N 4707-0013-21 Rev C) for the known problems with 12.06A software.

13.18 (Level 5)

The release of 13.18 software occurred on October 29, 1993. The release was to support NRR of Level 5 Non-DAASR (Digital Acquisition Analysis, Storage, and Retrieval), and DAASR–Ready (Demo) systems. All systems with 13.18 software were manufactured with the software installed. There was no field upgrade to 13.18 software.

Level 3 and Level 4 manufacturing lines were merged to become Level 5 on October 29, 1993. This release includes the following:

- Support of the P5–3 phased array scanhead with and without ESP.
- Support of the P3–2 phased array scanhead with ESP.
- Doppler scaling problem fixes.
- English, French, and German software versions.
- Doppler Power Imaging which is used to enhance visualization of the tissue vascular bed. This feature uses Doppler Power mode with a color map to display blood flow velocities of the same magnitude (in either direction toward or away from the scanhead) with the same color. This feature is supported with a PAL on the Spectral Estimator PCB.

Level 5 systems have several possible hardware combinations including:

- DAASR – initially scheduled for a Q1 1994 release. This release has been cancelled.
- DAASR–Ready – demo systems with hardware and software to support DAASR, but without the optical drive and associated cabling.
- Non-DAASR without Frame Grab – using the existing B/W and Color Scrolling Graphics PCBs (7500-0515 and 7500-0514).
- Non-DAASR without Frame Grab – using the Scrolling Graphics Display PCB (7500-0864) to replace the B/W and Color Scrolling Graphics PCBs (7500-0515 and 7500-0514).
- Non-DAASR without Frame Grab – using the Advanced Frame Grabber (7500-0554-XX) for the scrolling graphics functions. Frame grab functions are not currently available.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-22 Rev C for the known problems with 13.18 software.

13.18A

The release of 13.18A software occurred on November 1, 1993. The release was to support RFD of Level 5 Non-DAASR (Digital Acquisition Analysis, Storage, and Retrieval), and DAASR–Ready (Demo) systems. The release includes all the features of 13.18 and a fix for scrolling graphics problem on the AFG PCB. The fix included a new hard drive and two new PROMs for the AFG PCB (PROM Kit P/N 8000-0918-01). A limited number of systems were shipped with this software version. All systems with 13.18A software were manufactured with the software installed. There was no field upgrade to 13.18A software.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-22 Rev C for the known problems with 13.18A software.

UM9 HDI CV

UM-9 HDI CV systems were released on October 29, 1993 for the cardiovascular market. The systems support the P5–3 (ESP), P3–2 (ESP), P7 (non-ESP), T5 BP (non-ESP), and static CW probes for cardiology applications. The systems also support the L10–5 (ESP), L7–4 (ESP), P3–2 (non-ESP), T5 BP (non-ESP), D2, and static CW probes for vascular applications. Curved array and annular array scanheads are not supported on CV systems. The matrix camera, report printer, and Digital Image Manager are also not supported on CV systems.

Initial release of CV systems contained 13.18A software.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-22 Rev C for the known problems with CV system software (13.18).

13.18C

Release of 13.18C software occurred on November 24, 1993. The software included all features of 13.18A software and added support for the C4–2 scanhead.

NOTE: This software version requires config bit changes for the different CPU PCBs (Special HW Config 3) and the control panels (Special SW Config 4). Refer to **Table 5B–5**.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-22 Rev C for the known problems with 13.18C software.

13.18F

Release of 13.18F software occurred on February 25, 1994 to support production shipments (replaces 13.18C). The software modifies acoustic output for the L10–5 scanhead. The release of 13.18F software included a hard drive only (no PROMs).

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-22 Rev C for the known problems with 13.18F software.

13.18G

Release of 13.18G software occurred on March 18, 1994 to support production shipments (replaces 13.18C and 13.18F). The software modifies acoustic output for the L7–4 scanhead. The release of 13.18G software included a hard drive only (no PROMs).

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-22 Rev C for the known problems with 13.18G software.

13.18H

Release of 13.18H software occurred on April 1, 1994 to correct L7–4 scanhead API files in 13.18G French and German software

versions. The software incorporates all the features of 13.18G software. The release of 13.18H software included new hard drives for French and German software versions (no PROMs). The hard drive is a direct replacement for the 13.18C, 13.18F, or 13.18G hard drive.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-22 Rev C for the known problems with 13.18H software.

13.19

Release of 13.19 custom upgrade software occurred on January 28, 1994. This software upgrade is for targeted customers only. Custom Upgrade features include the following:

- Extended Signal Processing (ESP).
- C4–2 40R curved array scanhead (with ESP and non-ESP systems).
- C7–4 curved array scanhead (non-ESP systems).

- P5–3 phased array scanhead (non-ESP systems).
- Doppler and M-mode user interface enhancements.
- VCR control interface fixes.
- Corrects End Diastolic measurements in High Q™ Automatic Doppler Analysis.
- Patient name and date will now be displayed on OB graphs.
- Doppler Power Imaging (DPI).
- Removes the High PRF feature.
- Removes Frame Grabber and Tape Directory.
- Software version 13.19 is not for new build systems, nor will it be used as a software baseline. It is available only for customers who ordered one of the above features during 1993. The upgrade path is from 13.18C software to 13.19. Upgrade orders in 1994 will be supported by the 14.X baseline software release.

The software release is an interim step to improve the performance of specific systems. The release included a new hard drive and several PROMs.

13.19 software does not include the API changes made for the L10–5 scanhead on 13.18F software or the L7–4 scanhead on 13.18G or 13.18H software. There is no upgrade from 13.19 software to 13.18F, 13.18G, or 13.18H. The new API files for the L10–5 and L7–4 scanheads will be incorporated into the 14.13 software baseline. The scanheads are operational with the old API files.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-23 Rev C for the known problems with 13.19 software.

14.12 (Level 6)

Release of 14.12 software occurred on May 20, 1994. The software included all the features of 13.19 software and added the following:

- Clears annotation from the current patient specific information when NEW PATIENT is entered.
- Allows changes to ECHO/WRITE PRIORITY, COLOR MAPS, and COLOR BASELINE while in FREEZE.
- Adds the software build version number to the HELP screen.
- Changes the minimum color gain to 30% to support superficial applications.
- Clears the CALCS panel after the system has been unfrozen during Rad, OB, Gyn, Fert, TCD, and Vasc exam types.
- Adds security for CV systems. CV systems can no longer be reconfigured to HDI systems.
- Corrects for a time discontinuity problem when using the Doppler history buffer.
- Changes all OB Exam types selected through the application specific menus so they are limited to 94 mW/cm^2 independent of the main exam type.

- Fixes system lock-ups during Calcs after setting up the hardcopy device.
- Reduces the amount of extraneous graphics displayed when selecting FREEZE on 13.XX systems. Has no effect on systems with 10.43 through 12.06 software.
- Fixes M-mode calculation errors when entering SETUP mode. Also fixes M-mode scaling errors.
- Corrects for mis-display of peak velocity values in Card Calcs report.
- Corrects for operator changes in 2D depth causing incorrect scaling during use of triple mode Card Calcs.
- Eliminates “color dots” displayed in the near field which may misrepresent actual flow.
- Fixes a power monitor failure on the C5 IVT.
- Software version 14.12 supports English, French, and German languages and grayscale systems with or without ESP capability.

Installation of 14.12 software deactivates the Frame Grabber. Frame grab features will be re-activated in a subsequent software version.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-24 Rev A for the known problems with 14.12 software.

14.13

Release of 14.13 software occurred on June 10, 1994. There were no new PROMs associated with this release. The software included all the features of 14.12 software and added the following:

- Corrects data repositioning in the Doppler history buffer.
- Corrects M-mode depth scaling during depth changes while a report or setup overlay is displayed.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-25 Rev A for the known problems with 14.13 software.

15.00 (Level 6 Plus)

Release of 15.00 software occurred on August 12, 1994. There are no PROMs associated with this release. The software included all the features of 14.13 software and the following changes:

- Supports the P7–4 phased array scanhead.
- Changes the pediatric cardiology application presets.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-26 Rev A for the known problems with 15.00 software.

16.01 (Level 6 Plus)

Release of 16.01 software occurred on September 16, 1994. The Color Power Angio feature releases an enhanced version of Doppler Power Imaging and makes the following changes to system operation:

- Adds Color Power Angio setups and presets.
- Changes the user interface to allow access to Color Power Angio with two keystrokes from the main system panel. Transitions between Color Doppler and Color Power Angio are accomplished by one keystroke.
- Changes color maps A and C to support Color Power Angio.
- Enables the background display in the color box to be switched from the echo data to a solid color.

Framegrabber is not supported by 16.01 software.

The release includes English, French, and German software versions. Software version 16.01 will be rolled into the ongoing baseline program which started with the 14.13 software release.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-27 Rev B for the known problems with 16.01 software.

17.05 (Level 6 Plus)

Release of 17.05 software occurred on October 28, 1994. Software version 17.05 re-introduces Frame Grab features which were deactivated with 13.18 software. The software makes the following changes to system operation:

- For users without the Quick Print option, the system remains in the measurement mode when using the SETUP key for selection of the hardcopy device. On previous software versions, if the measurement calipers were on the display, and the operator

pressed the SETUP key, the calipers would disappear from the display.

- Fixes a problem with system operation when changing between CALCS and annotation during a Rad or OB exam. In previous software versions, under certain circumstances, the annotation cursor would freeze on the display.
- Changes the default color map for Vein Thigh and Vein Calf when using Color Power Angio (CPA) or Doppler Power Imaging (DPI) from Map C to Map A.
- Enables user setups and user OB tables to be recovered from the hard drive when RETRIEVE SETUPS is pressed. On previous software versions, the OB tables were lost when attempting to recall the tables from the hard drive.

- Allows the external video input to be viewed on the left video monitor. Simultaneously press the CNTRL and X keys to view the video signal on J9 (Composite). Press CNTRL and X again to turn the video off. Press CNTRL and V keys to view the video signal on J8 and J10 (Chroma/Luma or S-VHS). Press CNTRL and V again to turn the video off. This change will support video playback from Access t Acquisition Modules as well as CAMs.

- Allows the system to enter 2D/PW simultaneous mode when CPA is still enabled with Color off.

- Prevents all 2D measurements (except Volume Flow) from being made during split screen imaging. Doppler and M-mode measurements may be made as in previous software versions. (Previous software versions allowed 2D measurements to be made on incompatible displays, e.g. Doppler).

NOTE: Hidden digital software is different for the old and new versions of Frame Grabber software. Consequently, VCR taped images recorded on systems using the old Frame Grabber software cannot have measurements made on them using 17.05 software. The opposite is also true. VCR images recorded on 17.05 systems cannot have measurements made on them using the old software.

NOTE: The 4-on-1 Save/Recall feature is not functional on systems with the AFG PCB and 17.05 software. However, it is functional on systems without an AFG PCB.

The release includes English, French, and German software versions. Software version 17.05 will be rolled into the ongoing baseline program which started with the 14.13 software release.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-28 Rev A for the known problems with 17.05 software.

18.02D (Level 6 Plus)

Release of 18.02D software occurred on December 23, 1994. There are no PROMs associated with this release. The software included all the features of 17.05 software and the following changes:

D Supports the ENTOS t CL10–5 Intraoperative (Compact Linear) Scanhead. The CL10–5 is derived from the L10–5 and has a redesigned lens to improve near field images (1–30 mm).

D Adds the SURGERY application preset to support the CL10–5 scanhead. The application preset is located under the vascular pull-down menu even if the CL10–5 is not enabled.

NOTE: The CL10–5 scanhead is operational only on systems with ESP and 18.02D software and above.

D Corrects a problem with the patient directory on a VCR digital directory tape so the directory is not corrupted if the tape is ejected while a Save/ Recall image is being displayed.

- Fixes a problem with the first saved user-defined setup in RAD defaulting to C1 (processing curve) and E0 (Dynamic Contrast Enhancement) if the setup is saved as an auto-preset.
- Corrects a problem with the color wall filter value not being saved with a Save/Recall image. Subsequently recalled images used the current wall filter value instead of the originally saved wall filter.

The release includes English, French, and German software versions. Software version 18.02D will be rolled into the ongoing baseline program which started with the 14.13 software release.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-29 Rev A for the known problems with 18.02D software.

18.02E (Level 6 Plus)

Release of 18.02E software occurred on February 3, 1995. There are no PROMs associated with this release. The software included all the features of 18.02D software and the following change:

- Corrects a problem which causes the P7–4 scanhead files not to load from the hard drive. The problem affects only UM–9 HDI CV systems with English, French, and German software.

The release includes English, French, and German software versions. Software version 18.02E will be rolled into the ongoing baseline program which started with the 14.13 software release.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-30 Rev A for the known problems with 18.02E software.

19.04B (Level 7)

Release of 19.04B software occurred on July 21 1995. A Control Interface PCB (7500-0757-06) and PROM (4201-1121-04) were simultaneously released with, but not required for 19.04B software. Release of the PCB and PROM were to solve ESD issues. The software included all the features of 18.02E software and the following changes:

- Supports the MPT7–4 multiplane TEE scanhead.
- Supports the new C9–5 biopsy guide by adding a new biopsy guide path. The previous C9–5 biopsy guide is still supported with the two-line on-screen graphic indicating the range of the needle path. The user must select the biopsy guide they intend to use with the Set C9–5 Guide selection on the SETUP PANEL. The corresponding guide path will then be displayed. Select the “No Guide” option for customers with both guides. The system then prompts the user to select the correct biopsy guide when an application is selected.

- Changes system operation when using the C9–5 biopsy guide so that on inverted 2D images the “Guide to Target” message appears at the top of the monitor. On previous software versions, the message is displayed on the bottom of the monitor covering the needle entry point.
- Continues to display OB, GYN, and Fertility calcs after the system is taken out of freeze. With previous software versions, OB, GYN, and Fertility calcs were removed from the display.
- Changes system operation after entering the patient data entry menu and selecting “N” in the “new exam” field.

  With 19.04B software, if the user selects “N” in the new exam field, and then changes the exam type (i.e. vascular from OB), an application sidebar associated with the new exam type is displayed (i.e. vascular). The user should then select an application from within the sidebar. If no application is selected, the previous application remains active.

  On previous software versions, if the user selects “N” in the new exam field, and then changes the exam type (i.e. vascular from

OB), the previous application remains active. There is no application sidebar displayed.

D Adds user information (user defined OB tables, etc.) to the CMOS information which is saved to disk. The CMOS information saved to disk now includes the following:

Hospital name
Custom annotation
Custom presets
Hardcopy selects
Custom color maps
Custom 2D color maps
Custom OB tables
OB table selection
Auto presets
Hardware configuration log
Power-up time
System configuration

The release includes English, French, and German software versions. Software version 19.04B is not a baseline software version.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-31 Rev A for the known problems with 19.04B software.

19.04C (Level 7)

Release of 19.04C software occurred on August 18, 1995. There are no PROMs associated with this release. The software included all the features of 19.04B software and the following change:

- fixes an L10–5 scanhead recognition problem with 19.04B non-ESP systems.

The release includes English, French, and German software versions. Software version 19.04C is not a baseline software version.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-32 Rev A for the known problems with 19.04C software.

NOTE: Since there are no operational changes associated with release of 19.04C software, the Operating Notes are the same as those for 19.04B software. The only difference between Operating Notes for software versions 19.04B and 19.04C is the part number.

19.04D (Level 7)

Release of 19.04D software occurred on October 27, 1995. There are no PROMs associated with this release. The software included all the features of 19.04C software and the following change:

- corrects the shut-off temperature for the biplane TEE scanhead. The shut-off temperature was inadvertently changed from 42°C to 33°C in 19.04C software. There are no other operational changes for 19.04D software.

The release includes English, French, and German software versions. Software version 19.04D is not a baseline software version.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-33 Rev A for the known problems with 19.04D software.

NOTE: Since there are no operational changes associated with release of 19.04D software, the Operating Notes are the same as those for 19.04C software. The only difference between Operating Notes for software versions 19.04C and 19.04D is the part number.

19.04E (Level 7)

Release of 19.04E software occurred on January 26, 1996. There are no PROMs associated with this release. The software included all the features of 19.04D software and the following change:

- corrects the shut-off temperature for the multiplane TEE scan-head. The shut-off temperature has been changed from 42°C to 45°C to match the design specifications. There are no other operational changes for 19.04E software.

The release includes English, French, and German software versions. Software version 19.04E is not a baseline software version.

Known Problems

Refer to the Ultramark 9 HDI Operating Notes P/N 4707-0013-34 Rev A for the known problems with 19.04E software.

NOTE: Since there are no operational changes associated with release of 19.04E software, the Operating Notes are the same as those for 19.04D software. The only difference between Operating Notes for software versions 19.04D and 19.04E is the part number.

5B–2 Firmware Check Sums

This section contains a list of the firmware check sums for the UM-9 HDI System. The lists contained in **Table 5B–1** are similar in arrangement to the firmware list that is displayed on the video monitor when FIRMWARE REV LEVEL is selected from the ENGINEERING TEST PANEL.

Refer to the PROM tables under the individual PCBs in this section for a complete list of the PROMs on each PCB.

Table 5B–1. UM-9 HDI Firmware Check Sums

PCB Name/ Notes	EPROM Loca-tion	CBUS Addr.	SCBUS Addr.	EPROM Nomencla-ture	14.13–15X Check Sum	16.01 Check Sum	17.05 18.02 Check Sum	19.04B and up Check Sum		
CPU	U20	CB		CBus Mas-ter	F444	F444	F444	F444		
—	U12/ U16	80		Control Panel	B2F6/ 8F69	B2F6/ 8F69	B2F6/ 8F69	8F69/ 1ECD		
EIM	U5	B1		Echo Input	9744	9744	9744	9744		
Fr. Gr.	U4	AB		Frame Grabber	6F28	6F28	6F28	6F28		
Adv. Fr. Gr./ SGD	U27	AB		Adv. Fr. Grabber	EDDF	EDDF	8A65	8A65		
Master Gr.[4]	U85	A9		Graphics II	BB7B	BB7B	BB7B	BB7B		
Display Gr.[4]	U85	AA		Graphics III	B569	B569	B569	B569		
M-mode/ Phys.	U21	A6		M-mode	EBDF	EBDF	EBDF	EBDF		
M-mode/ Phys.	U19	A5		Physio	20C8	20C8	20C8	20C8		

PCB Name/ Notes	EPROM Loca- tion	CBUS Addr.	SCBUS Addr.	EPROM Nomencla- ture	14.13– 15X Check Sum	16.01 Check Sum	17.05 18.02 Check Sum	19.04B and up Check Sum		
AVP	U34/ U28	AF		Rear Panel	prom AE	prom AE	prom AE	prom AE		
Spect. Est.	U53	A3		Spectral Est.	61B1	61B1	61B1	61B1		
AVP w/o 7350 VCR[3]	U34/ U28	AE		VCR	ADA9/ 321E	ADA9/ 321E	203B/ 8C88	203B/ 8C88		
AVP w/ 7350 VCR[3]	U34/ U28	AE		VCR	9B8D/ 05D3	9B8D/ 05D3	46D5/ 47F5	46D5/ 47F5		
AVP w/o 7350 VCR[3]	U10/ U80	AD		Video Proc.	49FB/ F633	49F6/ F62E	D518/ E879	D518/ E879		
AVP w/ 7350 VCR[3]	U10/ U80	AD		Video Proc.	49FB/ F633	49F6/ F62E	D518/ E879	D518/ E879		
CDP	U13/U9	B5		CDP	825B	825B	825B	825B		
ADDA	U11	DD		DDA Proc.	3FDB	5701	5701	5701		
CPU	U67/ U66		7E	Master SCIP	6EFB	6EFB	6EFB	6EFB		
MMC	U59		58	MMC SCIP	6E63	6E63	6E63	6E63		

PCB Name/ Notes	EPROM Loca- tion	CBUS Addr.	SCBUS Addr.	EPROM Nomencla- ture	14.13–15X Check Sum	16.01 Check Sum	17.05 18.02 Check Sum	19.04B and up Check Sum		
	U72		58	MMC Eprom	02AD	02AD	02AD	02AD		
2			58	MMC Ram Codes	–	–	–	–		
IFOM (Stand alone)	U140		70	IFO SCIP	6EC3	6EC3	6EC3	6EC3		
	U88		70	IFO Eprom	CD34	CD34	CD34	CD34		
IFOM (Mas- ter /stand alone)	U166		70	IFO SCIP	6EC3	6EC3	6EC3	6EC3		
	U96		70	IFO Eprom	F0D4	F0D4	F0D4	F0D4		
2	—		70	IFO Ram Codes	–	–	–	–		
IFOM (Slave)[5]	U166		72	IFO SCIP	6ECB	6ECB	6ECB	6ECB		
5	U96		72	IFO Eprom	F0D4	F0D4	F0D4	F0D4		

PCB Name/ Notes	EPROM Loca-tion	CBUS Addr.	SCBUS Addr.	EPROM Nomencla-ture	14.13–15X Check Sum	16.01 Check Sum	17.05 18.02 Check Sum	19.04B and up Check Sum		
[2]	—		72	IFO Ram Codes	–	–	–	–		
FEC	U1		7C	OFE SCIP	6EF3	6EF3	6EF3	6EF3		
FEC [1]	U95/ U92		7C	OFE Eprom	3EFE	3EFE	3EFE	3EFE		
FEC [2]			7C	OFE Ram Codes	FE2C	FE2C	FE2C	FE2C		

1. U95 is used on 7500-0570 FEC PCB. U92 is used on 7500-0754 FEC PCB.
2. Ram Code check sum is obtained from a file on the hard drive. It is not a PROM check sum.
3. The first check sum is for 3500-1200/1201-01, -02 AVP PCBs. The second check sum is for 3500-1200/1201-03, -04 and 3500-1444-01 AVP PCBs.
4. Check sums are not displayed if the AFG PCB is installed.
5. Check sums are displayed only if the system is an ESP system.

5B–3 Software Configuration

System software for the UM-9 HDI system is contained on a hard drive. The part numbers and the revision levels are contained in the Software Replacement Matrix (**Table 5B–2** through **Table 5B–4**).

The feature set specified by the COA must be enabled using the front panel controls. **Table 5B–5** through **Table 5B–6** specify the hardware and software options available and the dash levels required for each option.

WARNING

Incorrect or non-standard configuration settings or jumper positions can cause system errors and measurement inaccuracies that could lead to possible errors in patient diagnosis.

- To perform a system configuration:

1. Press SETUP on the front panel.

2. Press the blank area next to CHANGE SETUPS four times to enter the Production-Service Test Panel.

3. Press ENGR TEST from the PRODUCTION-SERVICE TEST PANEL.

4. Press CONFIG on the ENGR TEST Panel. The left monitor displays “ORION II Configuration Utility” and the date and time the last configuration was performed. The monitor also displays the following prompt:

   Will data be modified? (Y/N)

5. Press “N” on the keyboard to view the existing configuration.

6. Press “Y” to change the configuration. Enter the password. (The password is provided to CSRs during the HDI training class or via product support.)

7. The current system serial number is displayed on the monitor with a prompt to change it. After making the appropriate selec-

tion, the hardware (pages 1 and 2) and software (pages 3 and 4) feature sets are displayed.

8. Use the options listed at the bottom of the monitor to change the configuration. Use the up and down arrow keys (or RETRN) to select options. Use the numeric keys to change the selection.

9. Press “S” to save the configuration changes or press “Q” to quit the procedure.

10. Cycle system power.

Table 5B–2. UM-9 HDI Hard Drive Part Numbers – English

Software Level	Hard Drive P/N	Dash No.	Level
14.13	4252-0715	10	6
15.00	4252-0723	02	6+
16.01	4252-0728	02	6+
17.05	4252-0733	05	6+

Software Level	Hard Drive P/N	Dash No.	Level
18.02D	4252-0740	07	6+
18.02E	4252-0740	08	6+
19.04B	4252-0748	06	7
19.04C	4252-0748	07	7
19.04D	4252-0748	08	7
19.04E	4252-0748	09	7

Table 5B–3. UM-9 HDI Hard Drive Part Numbers – French

Software Level	Hard Drive P/N	Dash No.	Level
14.13	4252-0716	06	6
15.00	4252-0724	02	6+
16.01	4252-0729	01	6+
17.05	4252-0734	03	6+
18.02D	4252-0741	03	6+
18.02E	4252-0741	04	6+
19.04B	4252-0749	02	7
19.04C	4252-0749	03	7
19.04D	4252-0749	04	7
19.04E	4252-0749	05	7

Table 5B–4. UM-9 HDI Hard Drive Part Numbers – German

Software Level	Hard Drive P/N	Dash No.	Level
14.13	4252-0717	06	6

15.00	4252-0725	02	6+
16.01	4252-0730	01	6+
17.05	4252-0735	03	6+
18.02D	4252-0742	03	6+
18.02E	4252-0742	04	6+
19.04B	4252-0750	02	7
19.04C	4252-0750	03	7
19.04D	4252-0750	04	7
19.04E	4252-0750	04	7

Table 5B–5. Configuration Utility – HW Options

Configuration Item	Dash No.	If COA Calls Out
System Core	–01 –02	Video format, NTSC (US TV) Video format, PAL (EUR TV) **WARNING:** **Incorrect or non-standard configuration settings can cause system errors and measurement inaccuracies that could lead to possible errors in patient diagnosis.**
Language	–01 –02 –03	English language kit French language kit German language kit
Color vs B/W	–00 –03 –04	Grayscale system Color system Color system with CPA ordered
Annular Array	–00 –01	Annular array not ordered Annular array ordered

Configuration Item	Dash No.	If COA Calls Out
Phased Array	–00 –01 –02 –04	Phased array not ordered Phased array ordered Phased array and bi-plane TEE ordered Phased array and MPTEE ordered
Linear Array	–01 –03	CV ordered (8500-0012-01) Normal configuration (8500-0011-01)
HW Option 1	–00 –02 –03	TCD, CW, and Steered CW not ordered TCD and CW only ordered TCD, CW, and Steered CW ordered
HW Option 2	–00 –01	No ESP ordered ESP or CV ordered
HW Option 3	–00	N/A
HW Option 4	–00	N/A
HW Option 5	–00	N/A
HW Option 6	–00	N/A
Int VCR	–01 –02 –00	Internal VCR, US TV Internal VCR, EUR TV Not ordered

HDI–5B–59

Configuration Item	Dash No.	If COA Calls Out
Ext VCR	–01 –00	If external VCR, US TV or EUR TV Not ordered
VCR Tape	–01 –02	VHS VCR S-VHS VCR
OEM Option	–00	N/A
Int M.I. Camera	–01 –02 –00	Multi-image camera, US TV Multi-image camera, EUR TV Not ordered
Int Mitsubishi Clr Ptr	–01 –02 –00	Mitsubishi color printer, US TV Mitsubishi color printer, EUR TV Not ordered
Int Clr Pg Ptr	–01 –02 –00	Internal Sony color printer, US TV Internal Sony color printer, EUR TV Not ordered
Int B/W Pg Ptr	–01 –02 –00	B/W page printer, US TV B/W page printer, EUR TV Not ordered
OEM Option 2	–00	N/A

HDI–5B–60

Configuration Item	Dash No.	If COA Calls Out
Ext M.I. Camera	–01 –02 –00	External multi-image camera, US TV External multi-image camera, EUR TV Not ordered
OEM Option 3	–00	N/A
Ext B/W Pg Ptr	–01 –02	Standard feature, US TV Standard feature, EUR TV
Ext Clr Pg Ptr	–00 –01 –02	Not ordered External color page printer, US TV or 3M Digital Image Manager and/or recorder, US TV External color page printer, EUR TV
Ext Plrd F/F Camera	–01 –02 –00	External Polaroid Freeze Frame Camera, US TV External Polaroid Freeze Frame Camera, EUR TV Not ordered
M-Mode ECG	–00 –01	Not ordered M-Mode/ECG or M-Mode only
M-Mode/ECG/Pulse	–00 –01	No Pulse/Phono ordered Pulse/Phono ordered

Configuration Item	Dash No.	If COA Calls Out
Doppler	–01	Standard feature
Frame Grabber (13.X, 14.X, 15.X, 16.X software)	–00 –03	Scrolling Graphics PCBs installed (7500-0514/7500-0515) SGD or AFG PCBs installed (7500-0864/7500-0554)
Frame Grabber (17.X, 18.X, 19.X software)	–00 –01 –02 –03	No Frame Grab. System has 7500-0514 and 7500-0515 Scrolling Graphics PCBs Frame Grab. System has old style 7500-0556 Frame Grab PCB Advanced Frame Grab. System has 7500-0554 Advanced Frame Grabber PCB and has ordered Video Frame Grab option No Frame Grab. System has 7500-0864 SGD PCB or 7500-0554 Advanced Frame Grab PCB and has not ordered Video Frame Grab option
Special HW Config 1	–01	Standard feature
Special HW Config 2	–00	N/A

Configuration Item	Dash No.	If COA Calls Out
Special HW Config 3	–3C –3D	7500-0573-XX CPU installed 7500-0749-XX CPU installed (Systems with a 7500-0573 CPU will not boot if this config bit is set to the 7500-0749 CPU setting.)
Special HW Config 4	–00	Not defined
Special HW Config 5	–00	Not defined

Table 5B–6. Configuration Utility – SW Options

Configuration Item	Dash No.	If COA Calls Out
Software Break Point	–00	Not a user feature
VA Number	–01 –00	If COA is for a VA Hospital Otherwise
S/W Test Mode	–00	Not a user feature
Medical Specialty	–00! –01! –02! –03!	RDS (Radiology) Level 5 and up CDS (Cardiology) Level 5 and up PVDS (Peripheral Vascular) Level 5 and up ODS (OB/GYN) Level 5 and up

Configuration Item	Dash No.	If COA Calls Out
RT/2D Update	–00	N/A
Tape Directory (13.X, 14.X, 15.X and 16.X software)	–00	N/A
Tape Directory (17.X software)	–00 –01	Frame Grab not ordered Frame Grab ordered
SW Option 1	–07	Standard feature (diagnostics)
SW Option 2	–00 –01 –02	ESP ordered No ESP ordered CV ordered
SW Option 3	–00	N/A
SW Option 4	–00	N/A
Biopsy Guide: Linear	–07	Standard feature
Biopsy Guide: Curved	–7F	Standard feature
Biopsy Guide: Annular	–01	Standard feature
Special SW Config 1	–00	Standard feature

Configuration Item	Dash No.	If COA Calls Out
Special SW Config 2	–00@	No analysis package ordered
	–01@	Vascular Analysis and High Q™ Option ordered
	–02@	8500-8384-01
	–04@	OB Analysis ordered, 8500-8300-01
		Cardiac Analysis ordered, 8500-8298-01

Configuration Item	Dash No.	If COA Calls Out
Special SW Config 3	–C2	Standard feature
Special SW Config 4	–00 –02 –80 –82	Grayscale system with old control panel Color system with old control panel Grayscale system with new control panel Color system with new control panel
Special SW Config 5	–08	Standard feature
Special SW Config 6	–00	N/A
Special SW Config 7	–00	N/A
Special SW Config 8	-00	N/A
Special SW Config 9	–00	N/A
Special SW Config 10 Special SW Config 11	–00 –00	N/A N/A
Default.ORN DRIVE	–42	Not a user feature

1. Codes/names for application packages (RDS, PVDS, ODS, and CDS) appear as line items on the COA. If not specified, configure for Radiology.
2. If multiple packages are ordered, add the numbers to obtain the correct config. code. (Example: if Vascular and OB are ordered, then -01 + -02 = -03.) The sum of these numbers must be in hexa-decimal notation.
3. Medical Specialty must be set to -01 or -02 for CV systems.

5B–3.1 UM-9 HDI System Data Save/Recall Procedures

During upgrade procedures, the default values and other information may be lost if it has not been saved to a floppy disk. The Data Save/Recall Disk (4252-0550-02) provides automated software routines for saving key UM-9 HDI system data to a floppy disk. This data includes user setups, user defined tables, power-on time, system configuration, and the hardware configuration log. The recall disk is used for short term storage of key system data during system software upgrades. The data is stored to the floppy disk and recalled onto the system hard disk. Do not use this disk for long term storage of system data or erroneous up-time data may be recalled into the system.

Observe the following notes when using the Data Save/Recall Disk:

NOTE: Use a separate disk for each system to prevent recalling erroneous system configuration and up-time data.

NOTE: If user-defined setups have not been saved to the hard drive, using these programs will generate error messages on the system monitors indicating that no files have been copied. This message only indicates that user-defined setups were not copied because they did not exist. All other system data will be copied correctly.

NOTE: If the Hardware Configuration Log (HLOG) has never been updated, using these programs will generate error messages on the system monitors indicating that no files have been copied. This message only indicates that the hardware log was not copied because it did not exist. All other system data will be copied correctly.

NOTE: When using the Data Save/Recall procedure on systems with 19.04B software and above, customer data which required manually recording with previous software versions (18.02E and below) is now automatically saved to the Data Save/Recall disk. The types of customer data saved includes the instituion name, camera settings, OB tables, hardware configuration log, power-up time, system configuration, color maps, and etc. The Data Save/Recall procedure is the same for all software versions. Systems being upgraded to 19.04B will still need to have the settings manually recorded.

Saving System Data to Floppy Disk

1. Turn on the system.

2. Press STORE SETUPS on the interactive display to save the user defaults to the hard disk.

3. Access USD DOS. Access instructions are not detailed in this manual for security reasons. This procedure is discussed in the

HDI training course and should not be attempted by untrained personnel.

4. Insert the System Data Save/Recall Disk into the floppy drive.

5. Type B: at the USD DOS prompt and press RETRN to switch to the B drive (floppy drive).

6. Type SAVE and press RETRN. The system copies the necessary files to the floppy disk.

Recalling System Data to Hard Drive

1. Turn on the system.

2. Access USD DOS.

3. Insert the System Data Save/Recall Disk into the floppy drive.

4. Type B: and press RETRN to switch to the B drive (floppy drive).

5. Type RECALL on the system keyboard and press RETRN. System status is displayed on the monitor.

6. Remove the floppy disk from the drive.

7. To properly retrieve OB Tables, press the TRASH CMOS key on the SYSTEM STATUS touch panel.

8. Press RETRIEVE SETUPS on the interactive display to retrieve the user defaults from the floppy disk.

5B–3.2 Saving and Recalling User Setups Only

The UM-9 HDI System Data Save/Recall Disk (4252-0550-02) may also be used for the long term storage of user-setups only (does not save system configuration, up-time data, etc.).

Storing User Setups Only

1. Turn on the system.

2. Insert the System Data Save/Recall Disk into the floppy drive.
3. Press the SETUP button on the control panel.
4. Press STORE SETUPS on the interactive display to save the user defaults to the floppy disk.
5. Press “Y” on the keyboard to answer the prompt about storing current setups. The system displays the following message on the left monitor “SAVING User-setups Data to Disk. PLEASE WAIT...”.

Retrieving User Setups Only

1. Turn on the system.
2. Insert the System Data Save/Recall Disk into the floppy drive.
3. Press the SETUP button on the control panel.
4. Press RETRIEVE SETUPS on the interactive display to retrieve the user defaults from the floppy disk.

5. Press “Y” on the keyboard to answer the prompt about retrieving saved setups.
6. Remove the floppy disk from the drive.
7. Reboot the system.
8. Press the SETUP button on the control panel
9. Press STORE SETUPS on the interactive display to save the user defaults to the hard drive.
10. Press “Y” on the keyboard to answer the prompt about storing setups.

5B–3.3 UM-9 HDI Software Installation/Upgrade Procedure

Software installations/upgrades are accomplished by replacing the hard drive with a hard drive containing the new software.

1. Remove the upper rear cover.

2. Save the system data using the procedure “Saving System Data to Floppy Disk” on page HDI–5B–69.

3. Remove the attaching screws and slide the bull-nose forward.

4. Remove the four screws securing the drive and remove the drive

5. Disconnect the drive power and control cables.

6. Connect the cables to the new hard drive.

7. Install the new drive into the system.

8. Recall the system data using the procedure “Recalling System Data to Hard Drive” on page HDI–5B–70.

5C PCB Configuration

5C–1 Hardware Configuration

The PCB slot locations are listed in **Table 5C–1** and **Table 5C–2** for all tested system configurations. The PCBs in this section have been organized alphabetically by name.

All PCB configuration data including the PCB, PROM, and jumper matrices, and PCB silhouettes is contained on one page or on facing pages (where possible). Use the legend below for the replacement levels.

The Channel PCBs have the numbers 8 and 4 listed in the Feature Compatibility columns. These numbers indicate the number of Channel PCBs compatible with a specific feature set. Refer to Note 1 under the Channel PCB compatibility table for further information.

LEGEND

R = Recommended replacement level
A = Alternate acceptable replacement level
C = PCB is compatible with software, but no longer stocked
L = Order like for like
Y = Yes, compatible with feature
FE = Functionally equivalent
P = Purge from stock

Dashes indicate a software level is not compatible.

Table 5C–1. Card Cage PCB Locations by System Features (7500-0588 Motherboard)

FG and Scrolling Graphics PCBs		ESP and Scrolling Graphics PCBs		SGD and SCW PCBs		SGD and ESP PCBs		AFG and ESP PCBs		AFG and SCW PCBs	
Slot	**Name**	**Slot**	**Name**	**Slot**	**Name**	**Slot**	**Name**	**Slot**	**Name**	**Slot**	**Name**
A1	IM MEM	A1	IM MEM	A1	IM MEM	A1	IM MEM	A1	IM MEM	A1	IM MEM
A2	M-M / PHYS	A2	M-M / PHYS	A2	M-M / PHYS	A2	M-M / PHYS	A2	M-M / PHYS	A2	M-M / PHYS
A3	CPU	A3	CPU	A3	CPU	A3	CPU	A3	CPU	A3	CPU
A4	MST SG	A4	MST SG	A4	SGD[6]	A4	SGD[6]	A4	SPARE	A4	SPARE
A5	SLV SG	A5	SLV SG	A5	SPARE	A5	SPARE	A5	SPARE	A5	SPARE
A6	FG[4]	A6	FG[4]	A6	SPARE	A6	SPARE	A6	AFG[4, 7]	A6	AFG[4, 7]
A7	AVP	A7	AVP	A7	AVP	A7	AVP	A7	AVP	A7	AVP
A8	SC OAG B/W	A8	SC OAG B/W	A8	SC OAG B/W	A8	SC OAG B/W	A8	SC OAG B/W	A8	SC OAG B/W
A9	SC INT B/W	A9	SC INT B/W	A9	SC INT B/W	A9	SC INT B/W	A9	SC INT B/W	A9	SC INT B/W

FG and Scrolling Graphics PCBs		ESP and Scrolling Graphics PCBs		SGD and SCW PCBs		SGD and ESP PCBs		AFG and ESP PCBs		AFG and SCW PCBs	
Slot	**Name**	**Slot**	**Name**	**Slot**	**Name**	**Slot**	**Name**	**Slot**	**Name**	**Slot**	**Name**
A10	SC DB MEM	A10	SC DB MEM	A10	SC DB MEM	A10	SC DB MEM	A10	SC DB MEM	A10	SC DB MEM
A11	SC INT COL	A11	SC INT COL	A11	SC INT COL	A11	SC INT COL	A11	SC INT COL	A11	SC INT COL
A12	SC OAG COL	A12	SC OAG COL	A12	SC OAG COL	A12	SC OAG COL	A12	SC OAG COL	A12	SC OAG COL
A13	SPEC EST	A13	SPEC EST	A13	SPEC EST	A13	SPEC EST	A13	SPEC EST	A13	SPEC EST
A14	ADDA	A14	ADDA	A14	ADDA	A14	ADDA	A14	ADDA	A14	ADDA
A15	EIM	A15	EIM	A15	EIM	A15	EIM	A15	EIM	A15	EIM
A16	MTR CTRL[3]	A16	MTR CTRL[3]	A16	MTR CTRL[3]	A16	MTR CTRL[3]	A16	MTR CTRL[3]	A16	MTR CTRL[3]
A17	CDP	A17	CDP	A17	CDP	A17	CDP	A17	CDP	A17	CDP
A18	IFOM	A18	IFOM MST[5]	A18	IFOM	A18	IFOM MST[5]	A18	IFOM MST[5]	A18	IFOM
A19	DOP ACQ[1]	A19	IFOM SLV[5]	A19	DOP ACQ[1]	A19	IFOM SLV[5]	A19	IFOM SLV[5]	A19	DOP ACQ[1]

FG and Scrolling Graphics PCBs		ESP and Scrolling Graphics PCBs		SGD and SCW PCBs		SGD and ESP PCBs		AFG and ESP PCBs		AFG and SCW PCBs	
Slot	**Name**	**Slot**	**Name**	**Slot**	**Name**	**Slot**	**Name**	**Slot**	**Name**	**Slot**	**Name**
A20	2D ACQ[2]	A20	2D ACQ[2]	A20	2D ACQ[2]	A20	2D ACQ[2]	A20	2D ACQ[2]	A20	2D ACQ[2]
A21	FEC	A21	FEC	A21	FEC	A21	FEC	A21	FEC	A21	FEC
A22–A29	CHNL	A22–A29	CHNL	A22–A29	CHNL	A22–A29	CHNL	A22–A29	CHNL	A22–A29	CHNL

1. Doppler Acquisition PCB (MFE2) installed only if the system has ST CW.
2. 2D Acquisition PCB (MFE1) may or may not be installed in Non ST CW systems. May utilize the internal 120 MHz clock or the clock on the FEC.
3. Motor Controller PCB installed only if the system has A6–3 scanhead capability.
4. Frame Grabber PCB or Advanced Frame Grabber PCB installed only if the system has Frame Grabber option. Frame Grabber not functional for systems with 12.X to 16.X software.
5. Dual IFOMs installed only if the system has ESP. Non-ESP systems have a single IFOM in A18.
6. Combines the functions of the B/W and Color Scrolling Graphics PCBs.
7. Combines the functions of the B/W and Color Scrolling Graphics PCBs with the 7500-0556 Frame Grabber. Frame Grabber not functional for systems with 14.X to 16.X software.

Table 5C–2. Card Cage PCB Locations by System Features (7500-0677 Motherboard)

FG and Scrolling Graphics PCBs (10.X)		Scrolling Graphics PCBs only (12.X)		Scrolling Graphics Display PCB only		Advanced Frame Grabber PCB	
Slot	**Name**	**Slot**	**Name**	**Slot**	**Name**	**Slot**	**Name**
A1	CPU	A1	CPU	A1	CPU	A1	CPU
A2	SC OAG B/W	A2	SC OAG B/W	A2	SC OAG B/W	A2	SC OAG B/W
A3	SC INT B/W	A3	SC INT B/W	A3	SC INT B/W	A3	SC INT B/W
A4	SC DB MEM	A4	SC DB MEM	A4	SC DB MEM	A4	SC DB MEM
A5	SC INT COL	A5	SC INT COL	A5	SC INT COL	A5	SC INT COL
A6	SC OAG COL	A6	SC OAG COL	A6	SC OAG COL	A6	SC OAG COL
A7	MST SG	A7	MST SG	A7	SPARE	A7	SPARE
A8	FG[4]	A8	IM MEM	A8	SGD [6]	A8	AFG [7]
A9	SLV SG	A9	SLV SG	A9	IM MEM	A9	IM MEM
A10	AVP	A10	AVP	A10	AVP	A10	AVP
A11	M-M/PHYS	A11	M-M/PHYS	A11	M-M/PHYS	A11	M-M/PHYS
A12	IM MEM	A12	ADDA	A12	ADDA	A12	ADDA
A13	SPEC EST	A13	SPEC EST	A13	SPEC EST	A13	SPEC EST

FG and Scrolling Graphics PCBs (10.X)		Scrolling Graphics PCBs only (12.X)		Scrolling Graphics Display PCB only		Advanced Frame Grabber PCB	
Slot	**Name**	**Slot**	**Name**	**Slot**	**Name**	**Slot**	**Name**
A14	EIM	A14	EIM	A14	EIM	A14	EIM
A15	ADDA	A15	SLV IFOM[5]	A15	SLV IFOM[5]	A15	SLV IFOM[5]
A16	IFOM	A16	MST IFOM	A16	MST IFOM	A16	MST IFOM
A17	CDP	A17	CDP	A17	CDP	A17	CDP
A18	MTR CTRL[3]	A18	MTR CTRL[3]	A18	MTR CTRL[3]	A18	MTR CTRL[3]
A19	DOP ACQ[1]	A19	DOP ACQ[1]	A19	DOP ACQ[1]	A19	DOP ACQ[1]
A20	2D ACQ[2]	A20	2D ACQ [2]	A20	2D ACQ[2]	A20	2D ACQ[2]
A21	FEC	A21	FEC	A21	FEC	A21	FEC
A22–A29	CHNL	A22–A29	CHNL	A22–A29	CHNL	A22–A29	CHNL

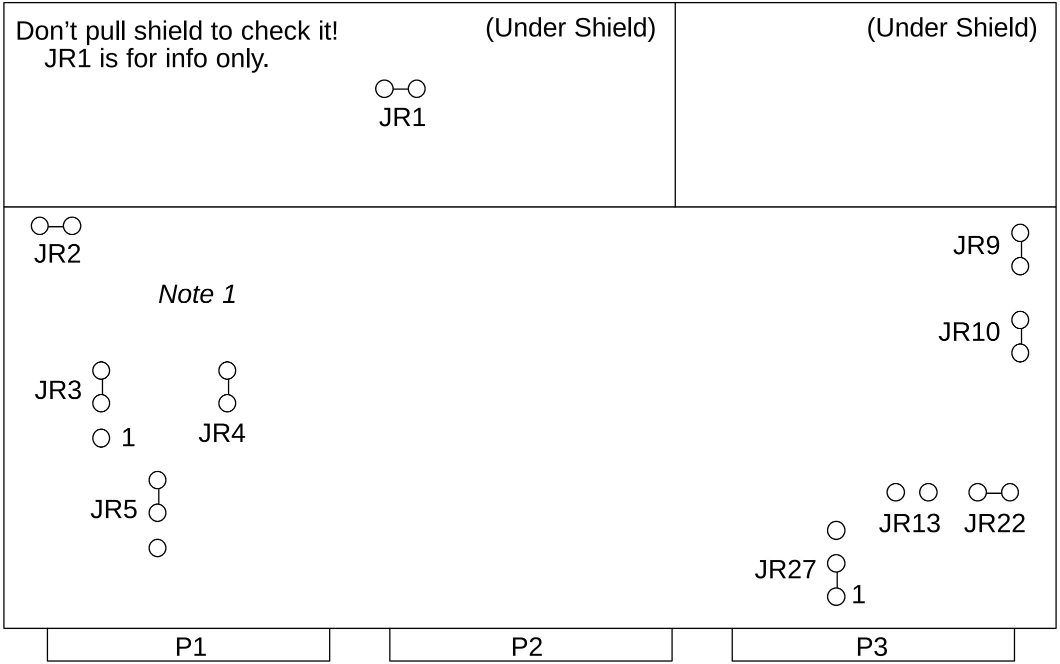
1. Doppler Acquisition PCB (MFE2) installed only if the system has ST CW.
2. 2D Acquisition PCB (MFE1) may or may not be installed in Non ST CW systems. May utilize the internal 120 MHz clock or the clock on the FEC.
3. Motor Controller PCB installed only if the system has A6–3 scanhead capability.
4. Frame Grabber PCB installed only if the system has Frame Grabber option.
5. Dual IFOMs installed only if the system has ESP. Non-ESP systems have a single IFOM in A16.
6. Combines the functions of the B/W and Color Scrolling Graphics PCBs.

7. Combines the functions of the B/W and Color Scrolling Graphics PCBs with the 7500-0556 Frame Grabber. Frame Grabber not functional for systems with 14.X to 16.X software.

2D Acquisition PCB (MFE1)

7500-0655	Replacement Levels					Features		
Dash No.	14.13 and up					ST CW		Notes
01	R					N		
03	A					N		
05	A					Y		
06	R					Y		
07	R					Y		
60	A					Y		

2D Acquisition PCB 7500-0655-01/03/05/06/07/60



Note 1: On the -03/05/06 PCBs, jumpers JR2 through JR5 may not be found. Configuration of these jumpers does not matter on the -03/05/06 PCB but does matter on the -01/60 PCB.

Advanced Digital Data Analyzer PCB

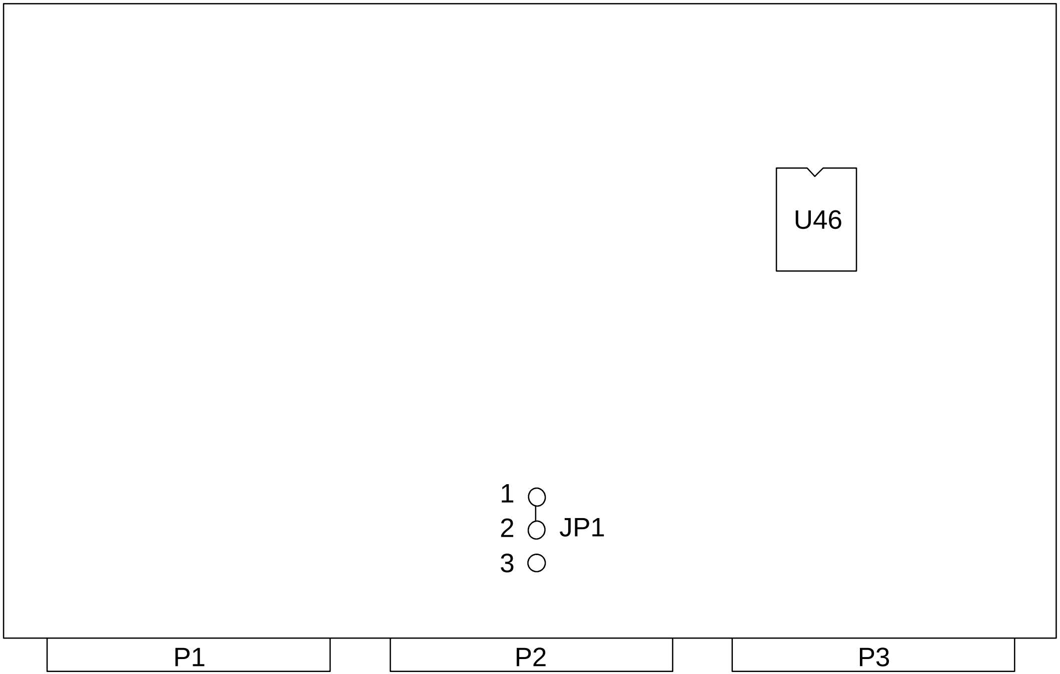
7500-0603	Replacement Levels					Features		
Dash No.	14.13 and up							Notes
09	A							
11	C							
12	C							
60	C							
13	C							
14	P							
15	C							
16	R							

PROMs

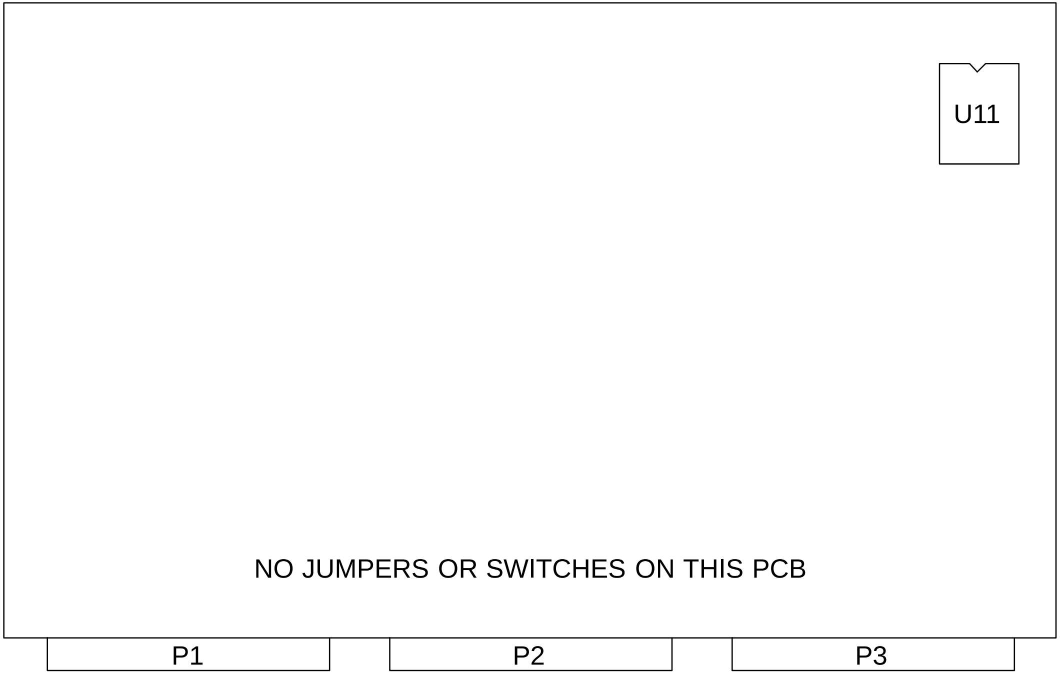
7500-0603	PROM Kit		Replacement Levels							
Dash No.	**Part No.**		**14.13 thru 15.00**	**16.01 and up**				**Location, P/N, Dash**		
09, 60, 11, 12, 13, 14, 15, 16	8000-0898	04	R					U11/ U46[1]	4201-1542	05
	8000-1030	01		R				U11/ U46[2]	4201-1753	01

1. Check Sum: 3FDB
2. Check Sum: 5701

Advanced Digital Data Analyzer PCB 7500-0603-09/60



Advanced Digital Data Analyzer PCB 7500-0603-11/12/13/14/15/16



Advanced Frame Grabber PCB

7500-0554	Replacement Levels					Features		
Dash No.	14.13 and up							Notes
04	C							1, 2
06	R							1, 2
08	A							1, 2
09	R							1, 2

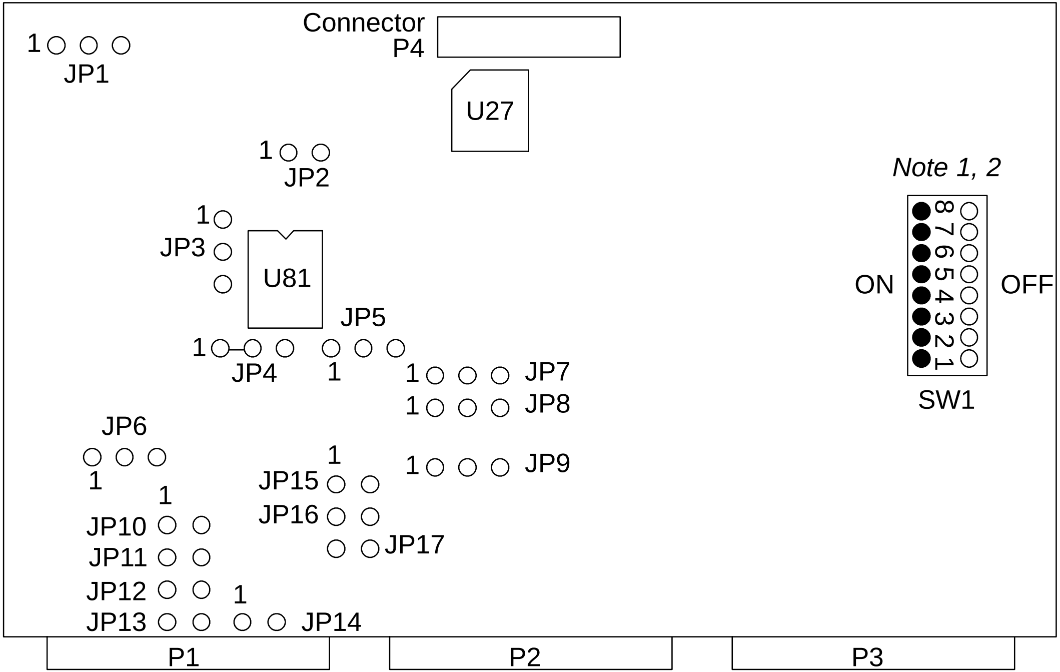
1. Advanced Frame Grabber PCB must be used with 3500-1200/1201-03 and higher or 3500-1444-01 and higher AVP PCBs.
2. Advanced Frame Grabber PCB may be installed in systems with 14.13 through 16.01, however, only non-frame grab functions are operational. Frame Grabber is fully functional on systems with 17.05 and up software.

PROMs

7500-0554	PROM Kit		Replacement Levels							
Dash No.	Part No.		14.13 thru 16.01	17.05 and up				Location, P/N, Dash		
04, 06, 08, 09	8000-0918	07	R					U27[2]	4201-1535	13
								U81[1]	4201-1536	04
	8000-1085	01		R				U27[3]	4201-1771	01
								U81[1]	4201-1536	04

1. Check Sum: A0CC Firmware Address: None
2. Check Sum: EDDF Firmware Address: AB
3. Check Sum: 8A65 Firmware Address: AB

Advanced Frame Grabber PCB   7500-0554-04/06/08/09



Note 1: Press on the “d” to set each switch position.

Note 2: Set SW1-1 to ON for PAL or set to OFF for NTSC.

Part No.		Replacement Levels					Features			Notes
		14.13 and up					Adv. Frame Grab	Image Vue	ST CW	
3500-1200	02	A					N	N	Y	NTSC, 1
	03	C					Y	Y	Y	NTSC
	04	R					Y	Y	Y	NTSC
3500-1201	02	A					N	N	Y	PAL, 1
	03	C					Y	Y	Y	PAL
	04	A					Y	Y	N	PAL
3500-1444	01	R					Y	Y	Y	PAL

1. Not compatible with the frame grab feature when using the Advanced Frame Grab PCB (7500-0554-XX).

PROMs

Part No.		PROM Kit Part No.		Replacement Levels 14.13 thru 15.00	16.01	17.05 and up			Location, P/N, Dash		
3500-1200 3500-1201	02	8000-0947 7350 VCR	03	R					U10[1]	4201-1587	03
									U34[2]	4201-1588	04
		8000-1031 7350 VCR	01		R				U10[3]	4201-1751	01
									U34[2]	4201-1588	04
		8000-1089 7350 VCR	01			R			U10[4]	4201-1767	01
									U34[5]	4201-1768	01
		8000-0953 w/o 7350 VCR	01	R					U10[1]	4201-1587	03
									U34[6]	4201-1591	01
		8000-1033 w/o 7350 VCR	01		R				U10[3]	4201-1751	01
									U34[6]	4201-1591	01
3500-1200 3500-1201	02	8000-1088 w/o 7350 VCR	01			R			U10[4]	4201-1767	01
									U34[7]	4201-1770	01

1. Check Sum: 49FB Firmware Address: AD
2. Check Sum: 9B8D Firmware Address: AF, AE
3. Check Sum: 49F6 Firmware Address: AD
4. Check Sum: D518 Firmware Address: AD
5. Check Sum: 46D5 Firmware Address: AF, AE
6. Check Sum: ADA9 Firmware Address: AF, AE
7. Check Sum: 203B Firmware Address: AF, AE

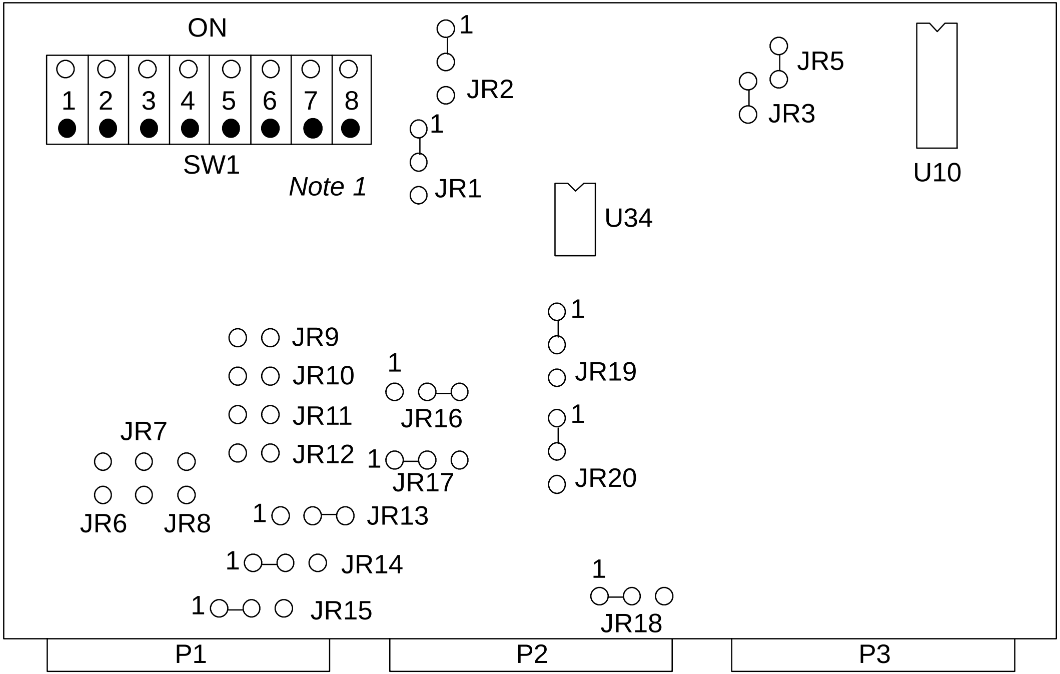
PROMs

Part No.		PROM Kit Part No.		Replacement Levels: 14.13 thru 15.00	16.01	17.05 and up			Location, P/N, Dash		
3500-1200	03	8000-0897 7350 VCR	05	R					U28[1]	4201-1576	05
	04								U80[2]	4201-1541	04
3500-1201	03	8000-1032 7350 VCR	01		R				U28[1]	4201-1576	05
	04								U80[3]	4201-1552	01
3500-1444	01	8000-1087 7350 VCR	01			R			U28[4]	4201-1766	01
									U80[5]	4201-1765	01
		8000-0963 w/o 7350 VCR	01	R					U28[6]	4201-1681	01
									U80[2]	4201-1541	04
		8000-1034 w/o 7350 VCR	01		R				U28[6]	4201-1681	01
									U80[3]	4201-1752	01
		8000-1086 w/o 7350 VCR	01			R			U28[7]	4201-1769	01
									U80[5]	4201-1765	01

1. Check Sum: 05D3 Firmware Address: AF, AE

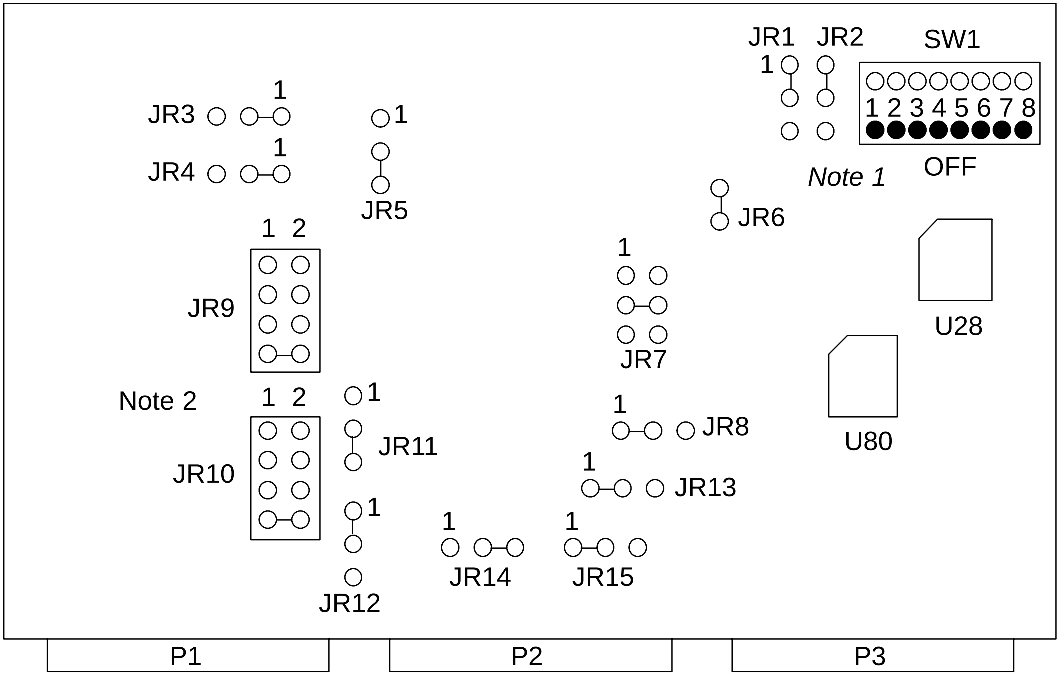
2. Check Sum: F633 Firmware Address: AD
3. Check Sum: F62E Firmware Address: AD
4. Check Sum: 47F5 Firmware Address: AF, AE
5. Check Sum: E879 Firmware Address: AD
6. Check Sum: 321E Firmware Address: AF, AE
7. Check Sum: 8C88 Firmware Address: AF, AE

Advanced Video Processor PCB 3500-1200-02 (NTSC)



Note 1: Press on the "d" to set each switch position.

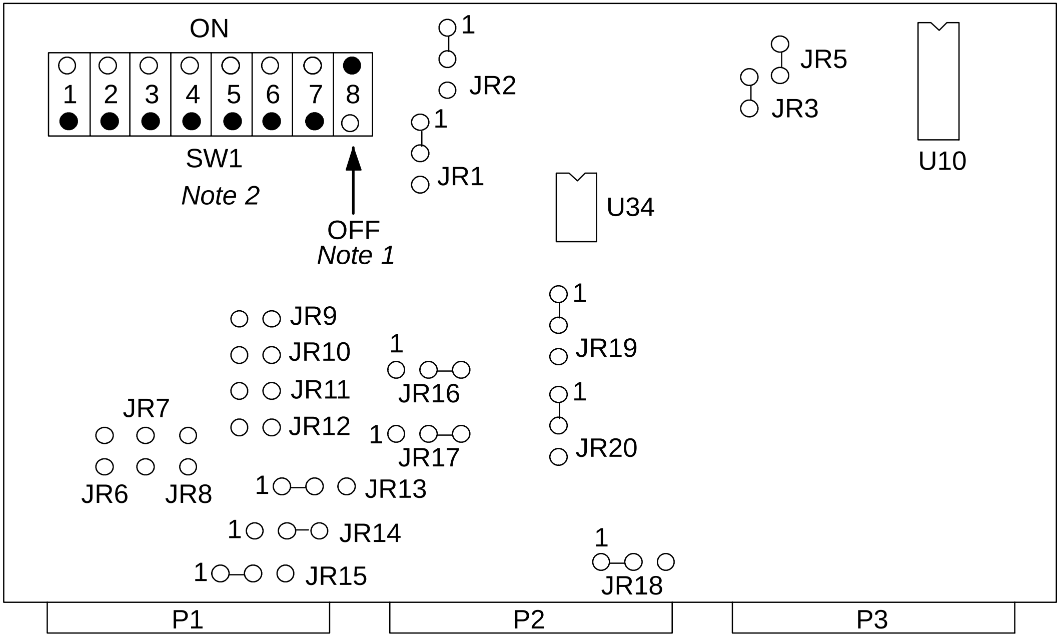
Advanced Video Processor PCB 3500-1200-03/04



Note 1: Press on the “d” to set each switch position.

Note 2: If the system contains the 7500-0514-XX and 7500-0515-XX Scrolling Graphics PCBs, set JP9 and JP10 to pins 1-2. If the system contains the Scrolling Graphics Display PCB (7500-0864-XX) or the Advanced Frame Grabber (7500-0554- XX) set JP9 and JP10 to pins 7-8.

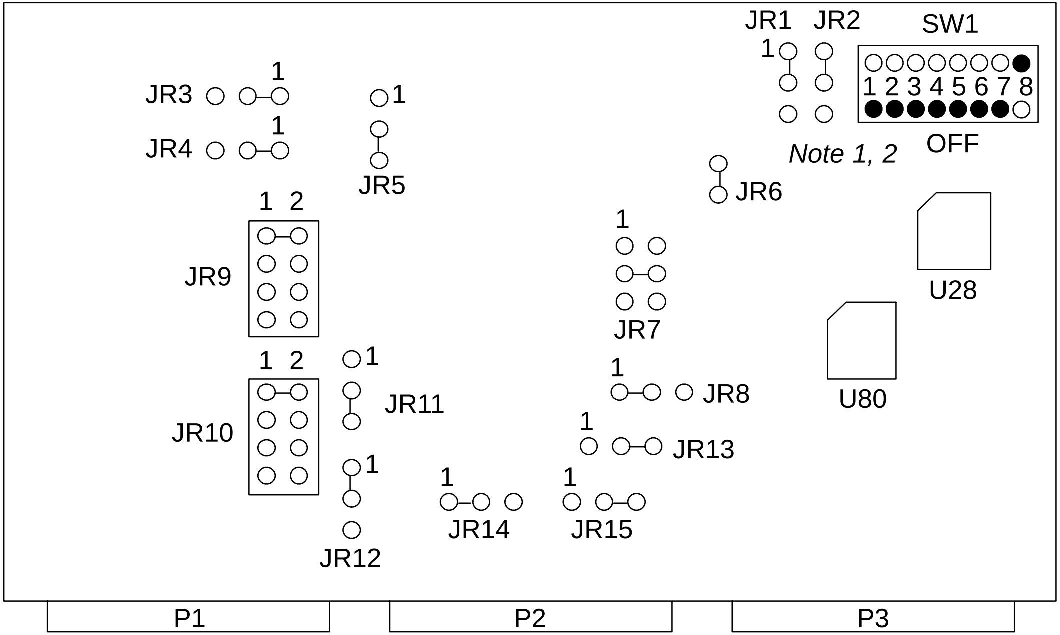
Advanced Video Processor PCB 3500-1201-02 (PAL)



Note 1: Press on the “d” to set each switch position.

Note 2: Set SW1-7 to ON for VHS VCR or set to OFF for SVHS.

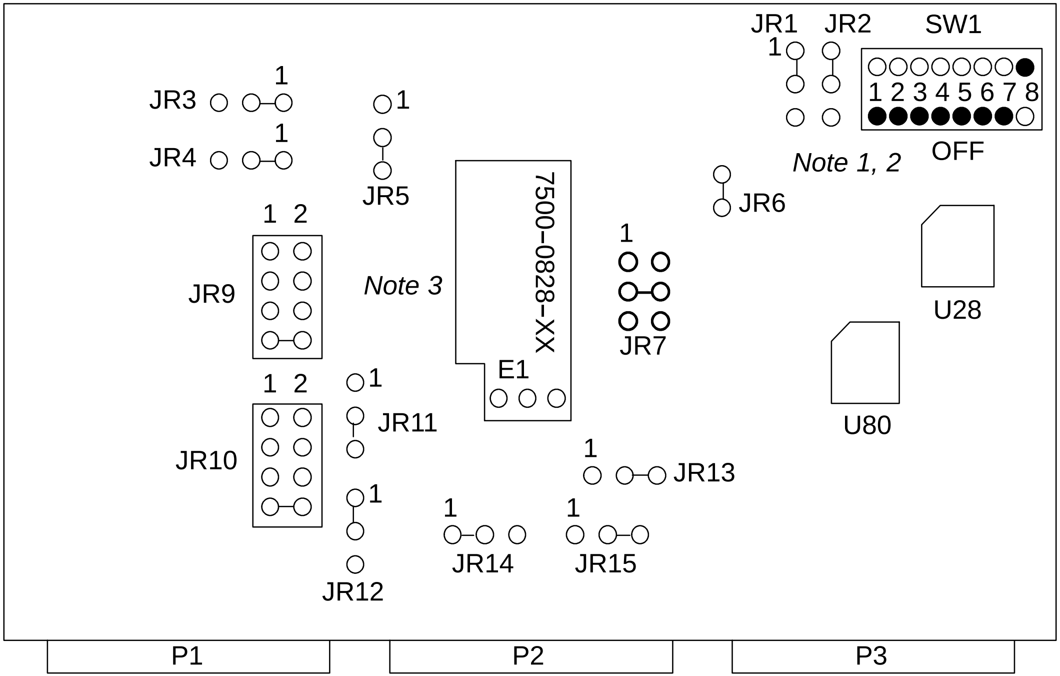
Advanced Video Processor PCB 3500-1201-03/04 (PAL)



Note 1: Press on the "d" to set each switch position.

Note 2: Set SW1-7 to ON for VHS VCR or set to OFF for SVHS.

Advanced Video Processor PCB 3500-1444-01 (PAL)



Note 1: Press on the “d” to set each switch position.

Note 2: Set SW1-7 to ON for VHS VCR or set to OFF for SVHS.

Note 3: Impacts Module (7500-0828-XX) is installed so E1 connects with JP8-1 on the AVP PCB.

Note 4: If the system contains the 7500-0514-XX and 7500-0515-XX Scrolling Graphics PCBs, set JP9 and JP10 to pins 1-2. If the system contains the Scrolling Graphics Display PCB (7500-0864-XX) or the Advanced Frame Grabber (7500-0554-XX) set JP9 and JP10 to pins 7-8.

B/W Scrolling Graphics PCB (Master Scrolling Graphics)

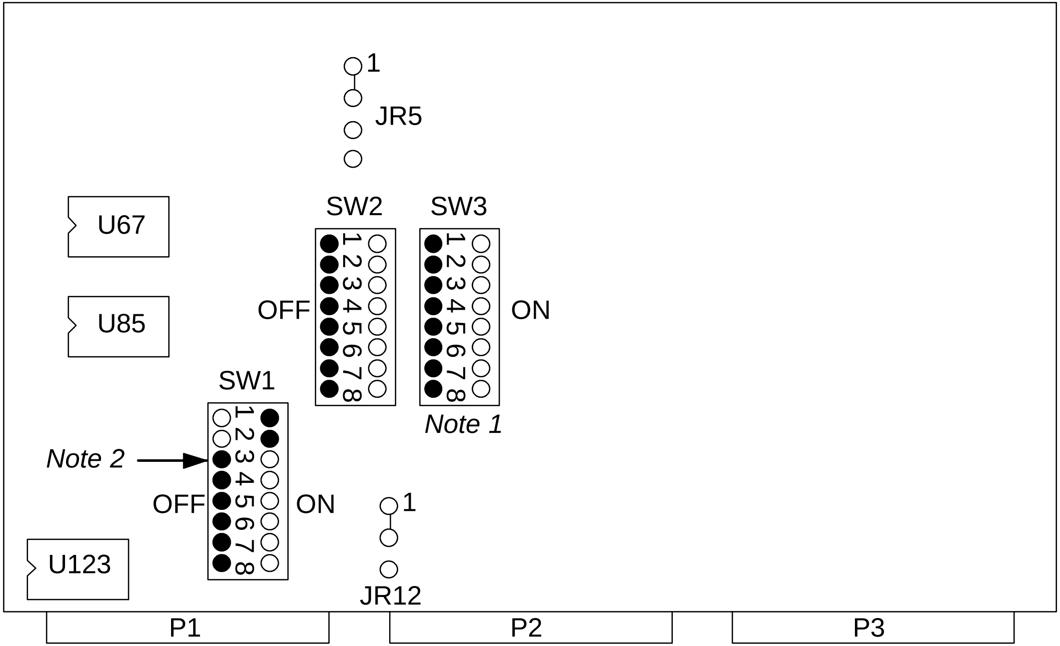
7500-0515	Replacement Levels					Features		
Dash No.	14.13 and up							Notes
01	R							

PROMs

7500-0515	PROM Kit		Replacement Levels							
Dash No.	Part No.		14.13 and up					Location, P/N, Dash		
01	8000-0945	01	R					U67[1]	4201-1583	01
								U85[2]	4201-1584	01
								U123[3]	4201-0827	02

1. Check Sum: 6E79 Firmware Address: A6
2. Check Sum: BB7B Firmware Address: None
3. Check Sum: 2F46 Firmware Address: None

B/W Scrolling Graphics PCB (Master Scrolling Graphics)
7500-0515-01



Note 1: Press on the “d” to set each switch position.

Note 2: Set SW1-3 to ON for NTSC operation or set to OFF for PAL.

Channel PCB

Part No.		Replacement Levels					Features				Notes
		14.13 and up					Non ESP/ Non ST CW	ESP/ Non ST CW	ST CW	ESP/ ST CW	
7500-0544	07	A					8	4, 8	N	8	1
	08	R					8	4, 8	N	8	1
	60	A					8	4, 8	N	8	1
	70	C					8	4, 8	N	8	1, 2
7500-0755	01	C					8	4, 8	N	8	1
	02	A					8	4, 8	8	8	1
7500-0772	03	A					8	4, 8	N	8	1
	04	R					8	4, 8	8	8	1

1. The numbers in the Feature Compatibility columns indicate the number of PCBs allowed for each feature. ESP systems with Non-steered CW can have four of the 7500-0544-XX PCBs interleaved with four of the 7500-07XX-XX PCBs. In this case, use the -0544 PCBs in slots A22, A24, A26, and A28. Use the -07XX PCBs in slots A23, A25, A27, and A29. Do not mix and match PCBs except as listed here.
2. To upgrade a 7500-0772-04 to a 7500-0544-60, or a 7500-0772-05/06 PCB to a 7500-0544-70, order and install 6220-0114-01 Channel Board Convertibility kit. When the 7500-0544-70 PCBs are returned to the factory, they are modified to become a 7500-0544-07 PCB.

NOTE: There are no PROMs or jumpers on the Channel PCBs.

Color Data Processor PCB

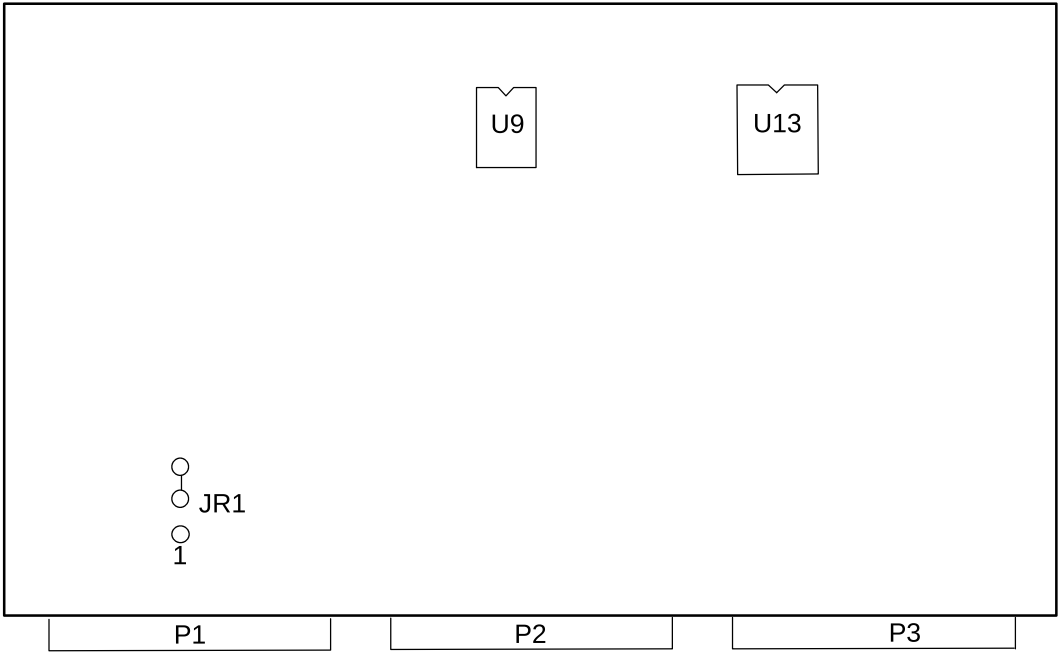
Part No.		Replacement Levels					Features				Notes
		14.13 and up									
7500-0602	05	A									
	07	A									
	08	C									
	09	A									
	10	C									
	11	R									
7500-0829	02	A									

PROMs

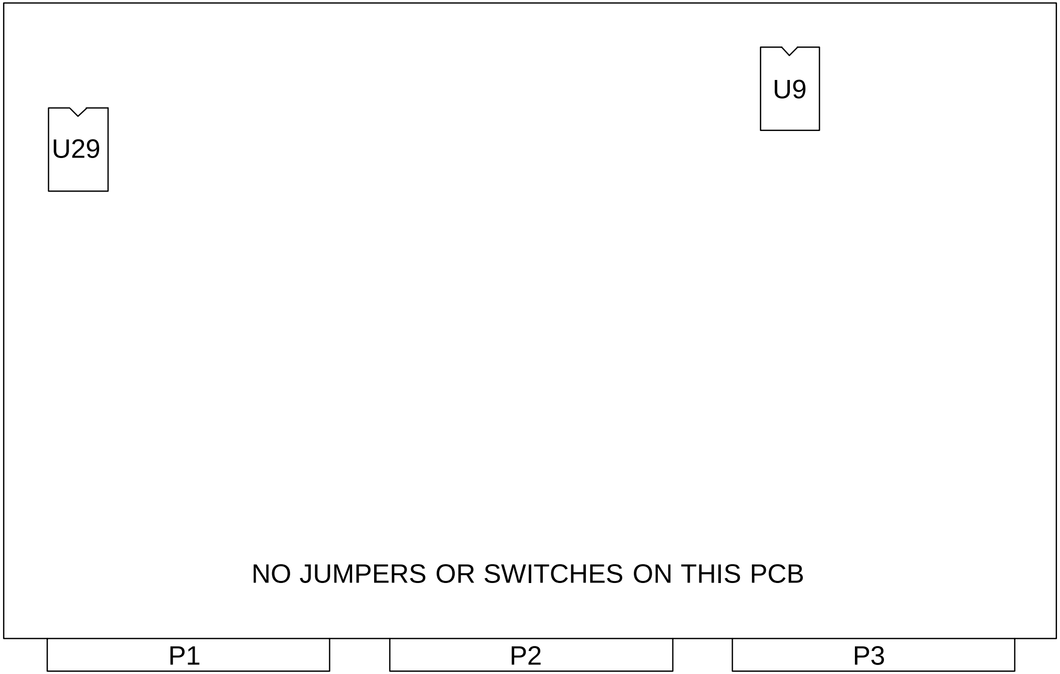
<table>
<tr><th rowspan="2" colspan="2">Part No.</th><th colspan="2">PROM Kit</th><th colspan="5">Replacement Levels</th><th rowspan="2" colspan="3">Location, P/N, Dash</th></tr>
<tr><th colspan="2">Part No.</th><th>14.13
and up</th><th></th><th></th><th></th><th></th></tr>
<tr><td rowspan="6">7500-0602</td><td>05</td><td rowspan="7">8000-0708</td><td rowspan="7">02</td><td rowspan="7">R</td><td rowspan="7"></td><td rowspan="7"></td><td rowspan="7"></td><td rowspan="7"></td><td rowspan="4">U9/
U29[1]</td><td rowspan="4">4201-0890</td><td rowspan="4">02</td></tr>
<tr><td>07</td></tr>
<tr><td>08</td></tr>
<tr><td>09</td></tr>
<tr><td>10</td><td rowspan="3">U13/
U9[2]</td><td rowspan="3">4201-1131</td><td rowspan="3">08</td></tr>
<tr><td>11</td></tr>
<tr><td>7500-0829</td><td>02</td></tr>
</table>

1. Check Sum: 6AE2 Firmware Address: B5
2. Check Sum: 825B Firmware Address: B5

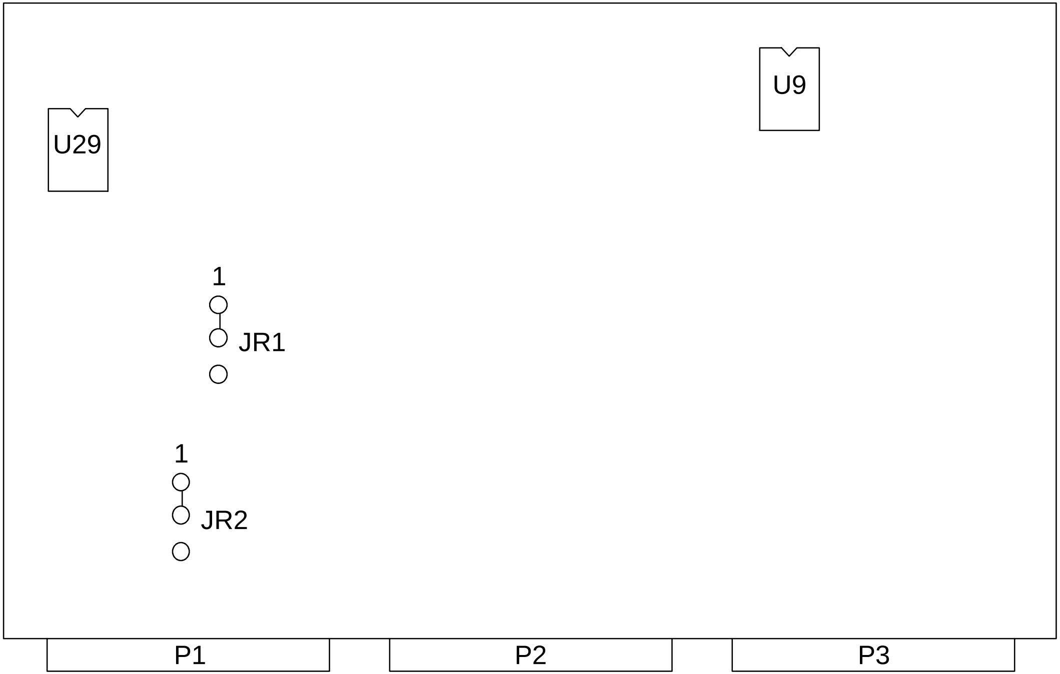
Color Data Processor PCB 7500-0602-05/07



Color Data Processor PCB 7500-0602-08/09/10/11



Color Data Processor PCB 7500-0829-02



Color Scrolling Graphics PCB (Display Graphics)

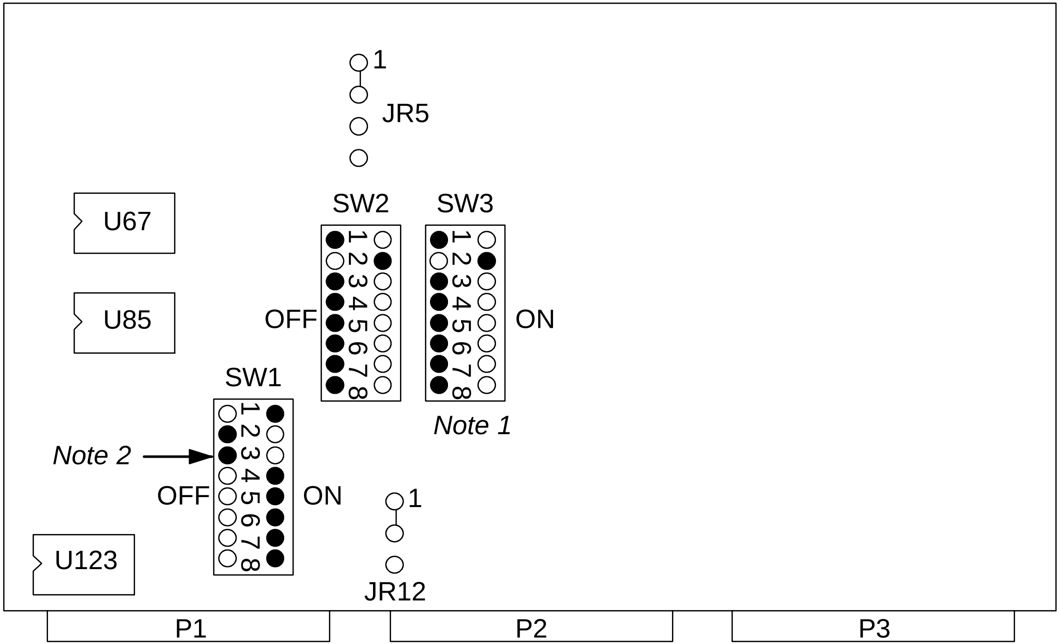
Part No.		Replacement Levels					Features				Notes
		14.13 and up									
7500-0514	01	R									

PROMs

Part No.		PROM Kit Part No.		Replacement Levels					Location, P/N, Dash		
				14.13 and up							
7500-0514	01	8000-0946	01	R					U67[1]	4201-1585	01
									U85[2]	4201-1586	01
									U123[3]	4201-0827	02

1. Check Sum: 0E50
2. Check Sum: B569 Firmware Address: AA
3. Check Sum: 2F46

Color Scrolling Graphics PCB (Display Graphics)
7500-0514-01



Note 1: Press on the “d” to set each switch position.

Note 2: Set SW1-3 to ON for NTSC operation or set to OFF for PAL.

Control Interface PCB

Part No.		Replacement Levels					Features		Notes
		14.13 and up					3500-1239/1238[1]	3500-1520/1521[2]	
7500-0689	01	A					Y	N	When ordering 7500-0689-01, also order the system level PROM.
	02	R					Y	N	When ordering 7500-0689-02, the PROM is included.
7500-0757	03	C					Y	Y	When ordering 7500-0757-03, the PROM is included.
	05	A					Y	Y	When ordering 7500-0757-05, the PROM is included.
	06	R					Y	Y	When ordering 7500-0757-06, the PROM is included.

1. Indicates compatibility with the 3500-1239/1238-XX control panel assemblies.

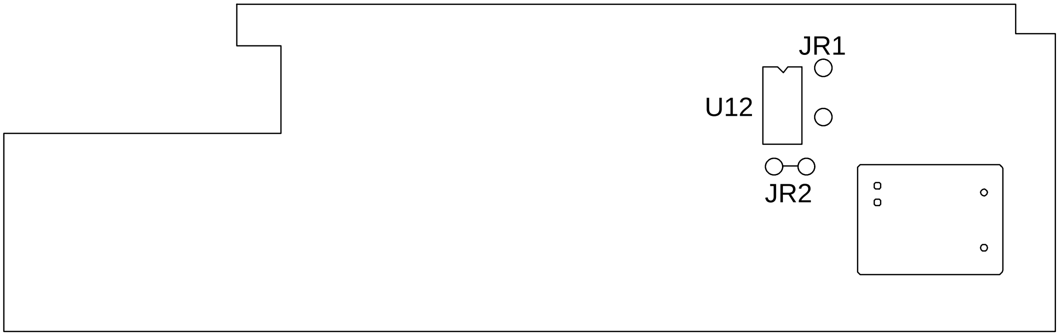
2. Indicates compatibility with the 3500-1520/1521-XX DAASR control panel assemblies.

PROMs

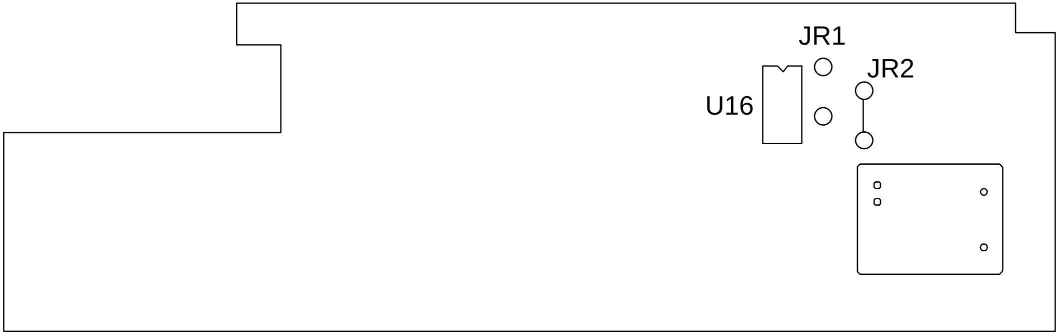
Part No.		PROM Kit Part No.		Replacement Levels 14.13 and up					Location, P/N, Dash		
7500-0689	01 02	8000-0654	02	R					U12[1]	4201-1121	02
7500-0757	03 05	Individual		R					U16[2]	4201-1121	03
	06	Individual		R					U16[3]	4201-1121	04

1. Check Sum: B2F6 Firmware Address: 80
2. Check Sum: 8F69 Firmware Address: 80
3. Check Sum:1ECD Firmware Address: 80

Control Interface PCB 7500-0689-01/02



Control Interface PCB 7500-0757-03/05/06



CPU PCB

Part No.		Replacement Levels					Features		Notes
		14.13 and up					Old MB	New MB	
7500-0573	07	C					Y	N	
	08	C					Y	N	
	09	C					Y	Y	
	10	L					Y	Y	
7500-0749	01	C					Y	Y	1
	02	L					Y	Y	1

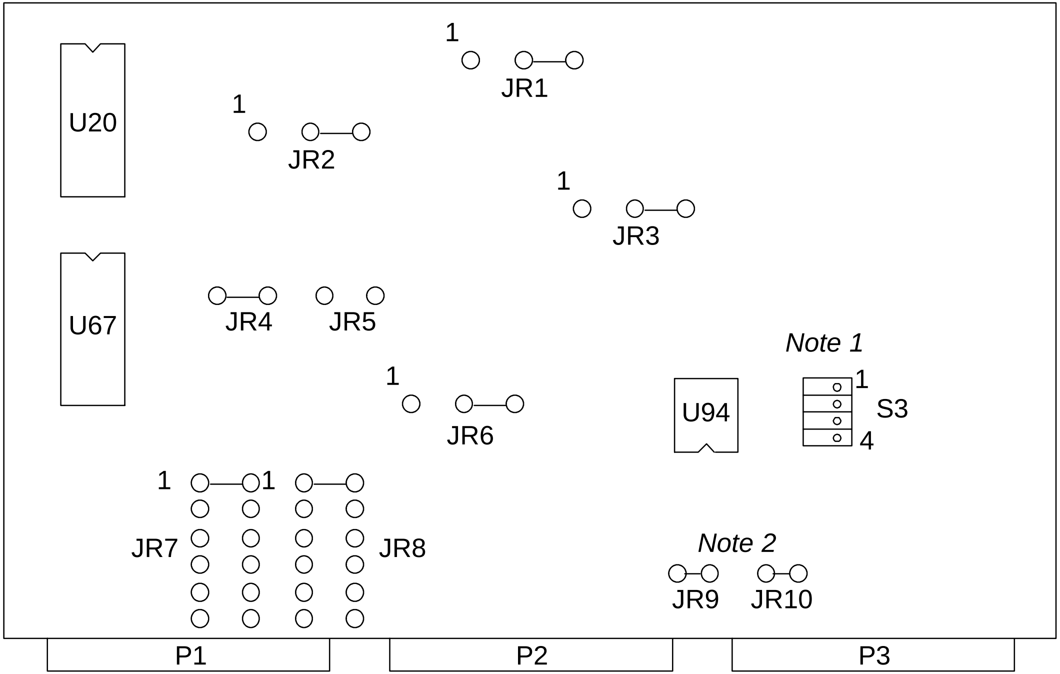
1. When replacing a 7500-0749 PCB with a 7500-0573 PCB, the system will not boot without changing the system software configuration settings. When changing from 7500-0573 to 7500-0749 on a 14.13 or higher system, the system will boot correctly without changing the software configuration.

PROMs

Part No.		PROM Kit Part No.		Replacement Levels 14.13 and up					Location, P/N, Dash		
7500-0749 7500-0573	01 02 09 10	8000-0932	01	–					U20[1]	4201-0825	01
									U67/66[2]	4201-1552	01
									U94/93[3]	4201-1353	02
7500-0749 7500-0573	01 02 07 08 09 10	8000-0932	02	R					U20[1]	4201-0825	01
									U67/66[2]	4201-1552	01
									U94/93[4]	4201-1353	03

1. Check Sum: F444 Firmware Address: CB
2. Check Sum: 6EFB
3. Check Sum: 29EE
4. Check Sum: 47F9

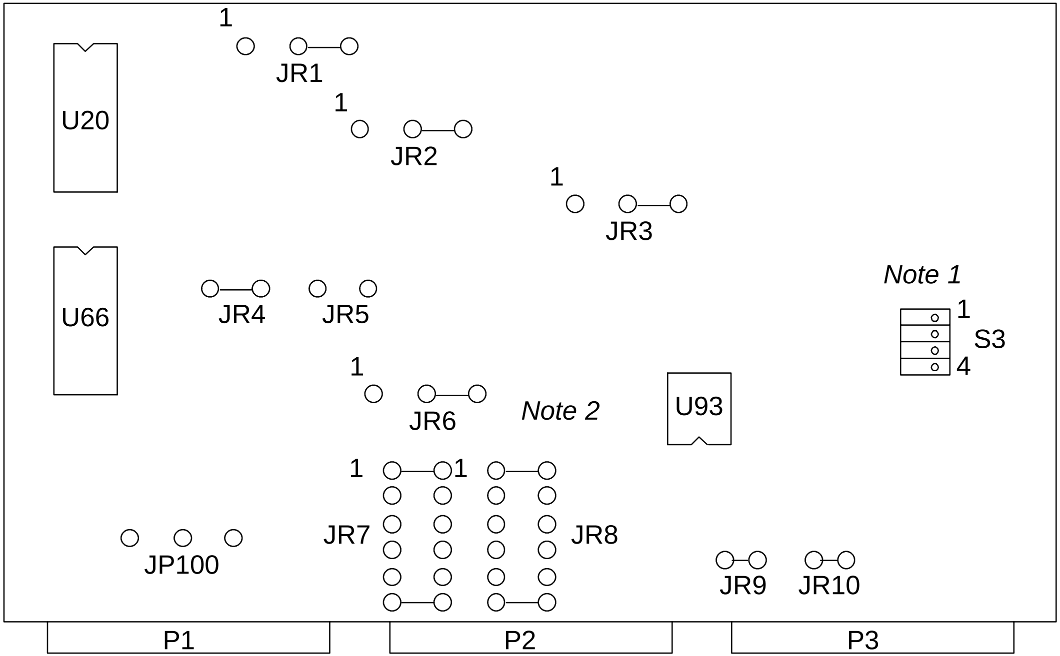
CPU PCB 7500-0573-07/08/09/10



Note 1: Press on the “d” to set each switch position.

Note 2: JP9 and JP10 are installed only for use with the Advance Frame Grabber PCB only.

CPU PCB 7500-0749-01/02



Note 1: Press on the “d” to set each switch position.

Doppler Acquisition PCB (MFE2)

Part No.		Replacement Levels 14.13 and up					Features ST CW				Notes
7500-0615	03	R					Y				
	04	R					Y				

NOTE: There are no PROMs or jumpers for the Doppler Acq. PCB.

Echo Input Module PCB

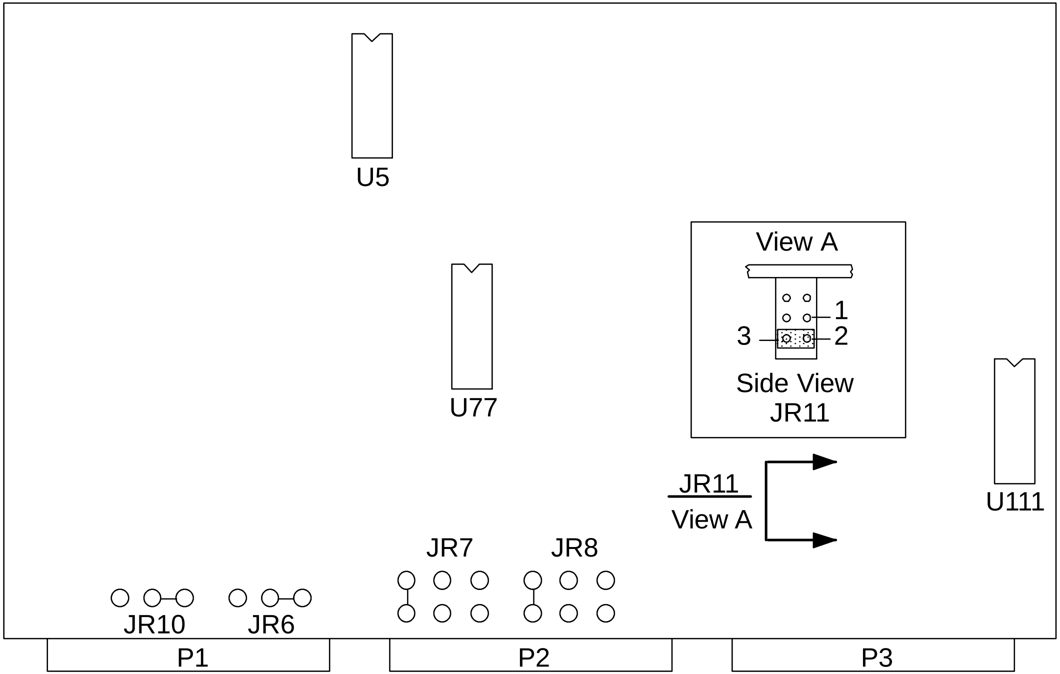
Part No.		Replacement Levels					Features		Notes
		14.13 and up					Old MB	New MB	
7500-0692	60	A					Y	N	P/N 7500-0692-01 changed to -60
	61	A					Y	Y	P/N 7500-0692-02 changed to -61
	04	R					Y	Y	

PROMs

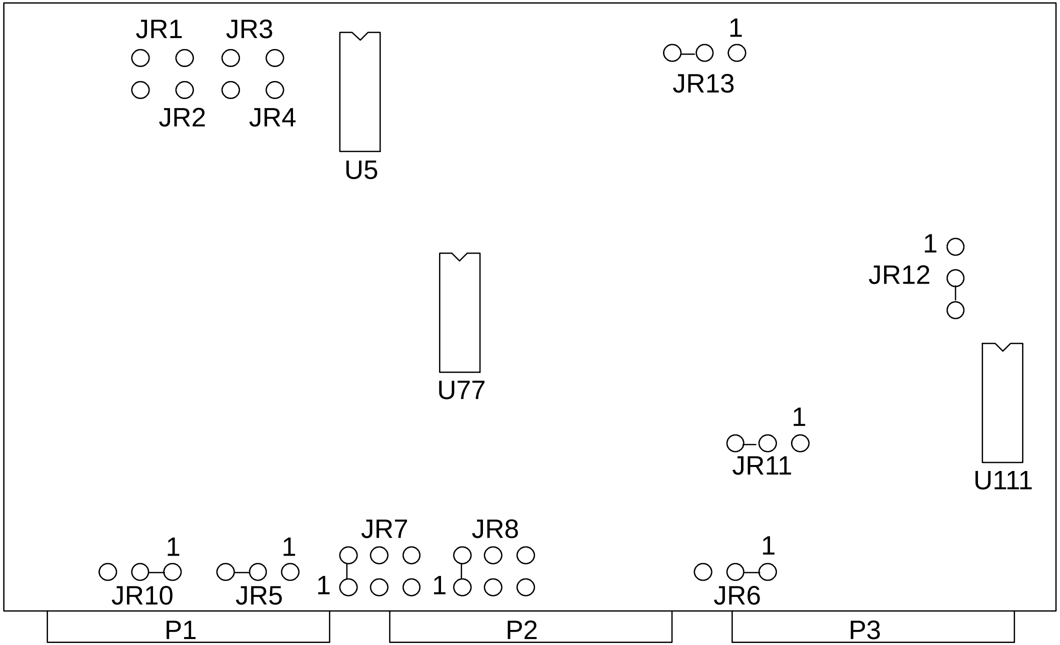
Part No.		PROM Kit		Replacement Levels					Location, P/N, Dash		
		Part No.		14.13 and up							
7500-0692	60 61 04	8000-0832	01	R					U5[1]	4201-1494	01
									U77[2]	4201-1133	01
									U111[3]	4201-1132	03

1. Check Sum: 9744 Firmware Address: B1
2. Check Sum: 7C7F Firmware Address: None
3. Check Sum: 6AFE Firmware Address: None

Echo Input Module PCB 7500-0692-60



Echo Input Module PCB 7500-0692-04/61


JR1
JR3
1
JR13
JR2
JR4
U5
1
JR12
U77
1
JR11
U111
JR7
JR8
1
1
1
1
1
1
JR10
JR5
JR6
P1
P2
P3

HDI–5C–50

Frame Grabber PCB

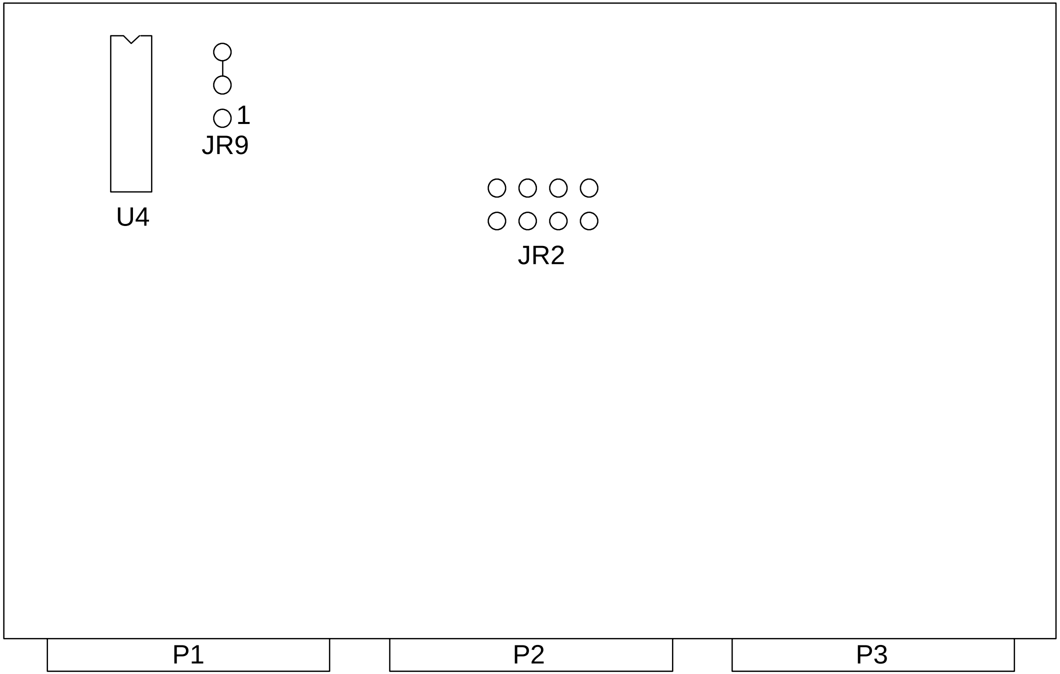
7500-0556	Replacement Levels					Features		
Dash No.	14.13 and up							Notes
01	R							1

PROMs

7500-0556	PROM Kit		Replacement Levels							
Dash No.	Part No.		14.13 and up					Location, P/N, Dash		
01	8000-0431	05	R					U4[2]	4201-0618	07

1. On systems with 14.13 through 16.01 software, the Frame Grabber PCB may be already in the card cage but is not functional. Frame Grabber PCB is fully functional on systems with 17.X and up software.
2. Check Sum: 6F28 Firmware Address: AB

Frame Grabber PCB 7500-0556-01



Front End Controller PCB

Part No.		Replacement Levels					Features				Notes
		14.13 and up					ST CW	A6–3			
7500-0570	07	C					N	N			
	08	C					Y	N			
	10	C					Y	Y			
	11	R					Y	Y			
7500-0574	03	C					N	Y			1
	04	C					Y	Y			1
	05	R					Y	Y			1

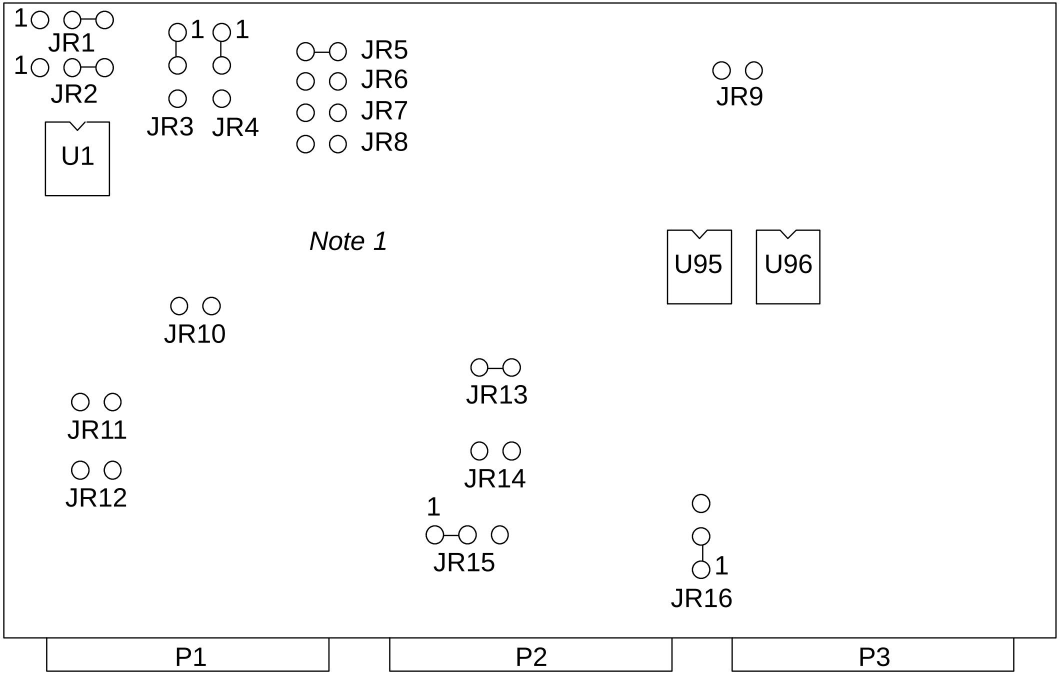
1. Does not require a 2D Acquisition PCB (MFE1) in non-steered CW systems.

PROMs

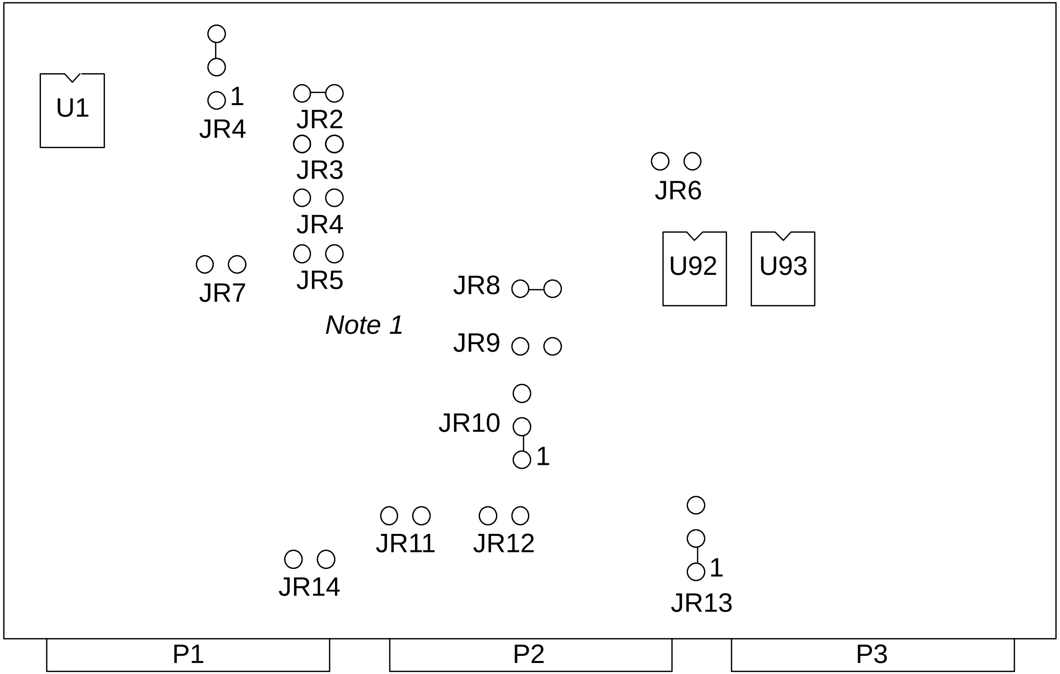
Part No.		PROM Kit Part No.		Replacement Levels 14.13 and up					Location, P/N, Dash		
7500-0570	07 08 10 11	8000-0888	02	R					U1[1]	4201-1553	01
7500-0754	03 04 05								U95[2]	4201-1501	02
									U96[3]	4201-1500	02

1. Check Sum: 6EF3 Firmware Address: None
2. Check Sum: 3EFE Firmware Address: None
3. Check Sum: 8FF2 Firmware Address: 7C

Front End Controller PCB 7500-0570-07/08/10/11



Front End Controller PCB 7500-0754-03/04/05



Note 1: Jumper positions shown are for non-steered CW systems. Refer to **Table 5C–3** and **Table 5C–4** for jumper positions on steered CW/CW/TCD systems.

Table 5C–3.   Front End Controller (7500-0570-XX)

PCB	Ref. Des.	Steered CW/CW/TCD[1]	Non-steered CW[2]
7500-0570-07/08/10/11	JP1	2-3 (right)	2-3 (right)
	JP2	2-3 (right)	2-3 (right)
	JP3	1-2 (up)	1-2 (up)
	JP4	1-2 (up)	1-2 (up)
	JP5	installed	installed
	JP6	not installed	not installed
	JP7	not installed	not installed
	JP8	not installed	not installed
	JP9	not installed	not installed
	JP10	not installed	not installed
	JP11	not installed	not installed
	JP12	not installed	not installed
	JP13	not installed	installed
	JP14	not installed	not installed
	JP15	2-3 (right)	1-2 (left)
	JP16	1-2 (down)	1-2 (down)

Table 5C–4. Front End Controller (7500-0754-XX)

PCB	Ref. Des.	Steered CW/CW/ TCD[1]	Non-Steered CW[2]	Non-Steered CW[3]
7500-0754-03/04/05	JP1	2-3	2-3	2-3
	JP2	1-2	1-2	1-2
	JP3 – JP7	not installed	not installed	not installed
	JP8	not installed	1-2	1-2
	JP10	2-3	1-2	1-2
	JP11	not installed	not installed	not installed
	JP12	not installed	not installed	not installed
	JP13	1-2	1-2	1-2
	JP14	not installed	not installeed	1–2

1. Indicates a system with -05 and up 2D Acquisition PCB (MFE1). Connect the 120 MHz cable from the 2D Acq to the FEC on these systems.
2. Indicates a system with a -03 or -01 2D Acquisition PCB. Do not connect the 120 MHz cable from the 2D Acquisition PCB to the FEC.
3. Indicates a system without a 2D Acquisition PCB.

IF Output Module PCB

Part No.		Replacement Levels					Features		Notes
		14.13 and up					ESP		
7500-0592	06	C					N		
	07	L					N		
7500-0783	07	C					Y		When used in ESP systems, master and slave PCB dash numbers must be the same.
	08	L					Y		
	09	L					Y		

PROMs (ESP and Stand-alone IFOM)

Part No.		PROM Kit Part No.		Replacement Levels 14.13 and up					Location, P/N, Dash		
7500-0592 Stand-alone only	06 07	8000-0968	01	R					U88[1]	4201-1367	02
									U140[2]	4201-1561	01
7500-0783 Master or Stand-alone	07 08 09	8000-0872	03	R					U80[3]	4201-1565	01
									U96[4]	4201-1563	01
									U123[5]	4201-1564	01
									U166[6]	4201-1561	01

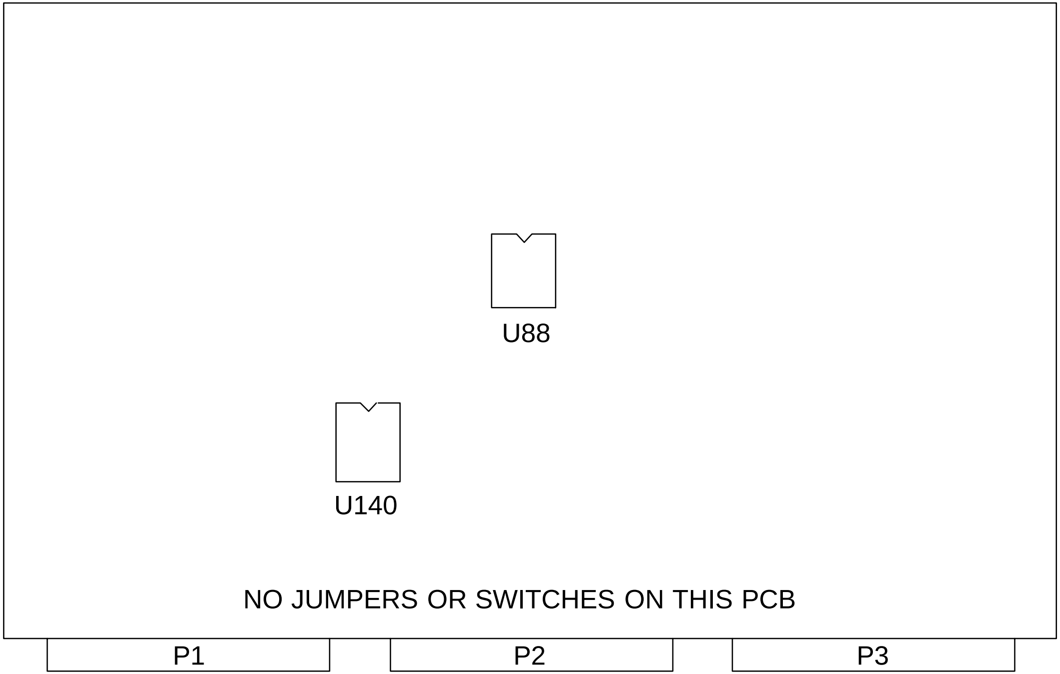
1. Check Sum: CD34 Firmware Address: 70
2. Check Sum: 6EC3 Firmware Address: None
3. Check Sum: ACE1 Firmware Address: None
4. Check Sum: F0D4 Firmware Address: None
5. Check Sum: 98A5 Firmware Address: None
6. Check Sum: 6EC3 Firmware Address: 70

PROMs (ESP)

Part No.		PROM Kit Part No.		Replacement Levels 14.13 and up					Location, P/N, Dash		
7500-0783 Slave only	07 08 09	8000-0871	03	R					U80[1]	4201-1565	01
									U96[2]	4201-1563	01
									U123[3]	4201-1564	01
									U166[4]	4201-1529	02

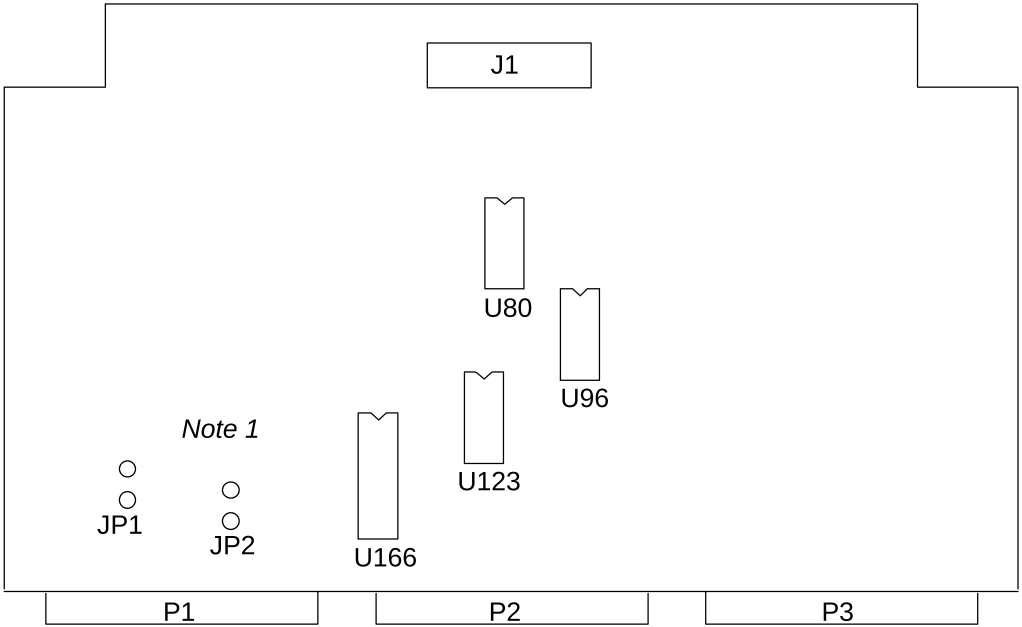
1. Check Sum: ACE1 Firmware Address: None
2. Check Sum: F0D4 Firmware Address: None
3. Check Sum: 98A5 Firmware Address: None
4. Check Sum: 6ECB Firmware Address: 72

IF Output Module PCB 7500-0592-06/07



IF Output Module PCB 7500-0783-07/08/09

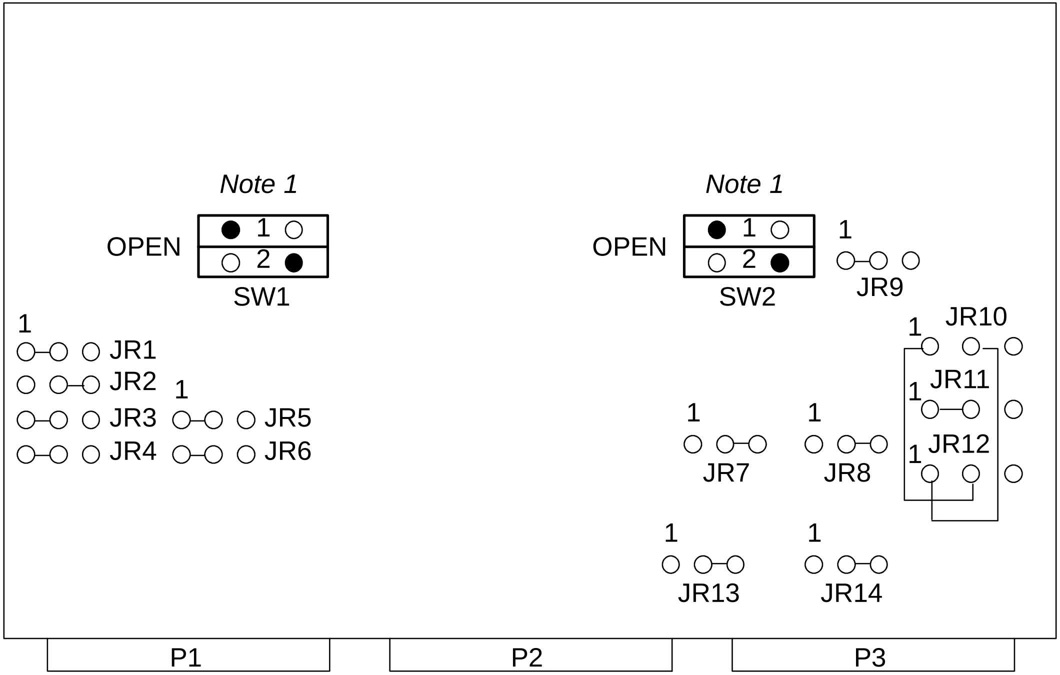
Note 1: Master IFOM (A16) JP1 and JP2 installed. Slave IFOM (A15) JP1 and JP2 not installed. Install JP1 and JP2 when the 7500-0783-XX PCB is used in stand alone configurations (non-ESP systems).



Part No.		Replacement Levels						Features		Notes
		14.13 and up								
7500-0405	13	A								256 Pages
7500-0722	03	A								256 Pages
	04	A								256 Pages
	05	R								256 Pages
7500-0569	03	L								64MB

NOTE: There are no PROMs for the Image Memory PCB.

Image Memory PCB 7500-0405-13



Note 1: Press on the “d” to set each switch position.

Image Memory PCB 7500-0722-03/04/05

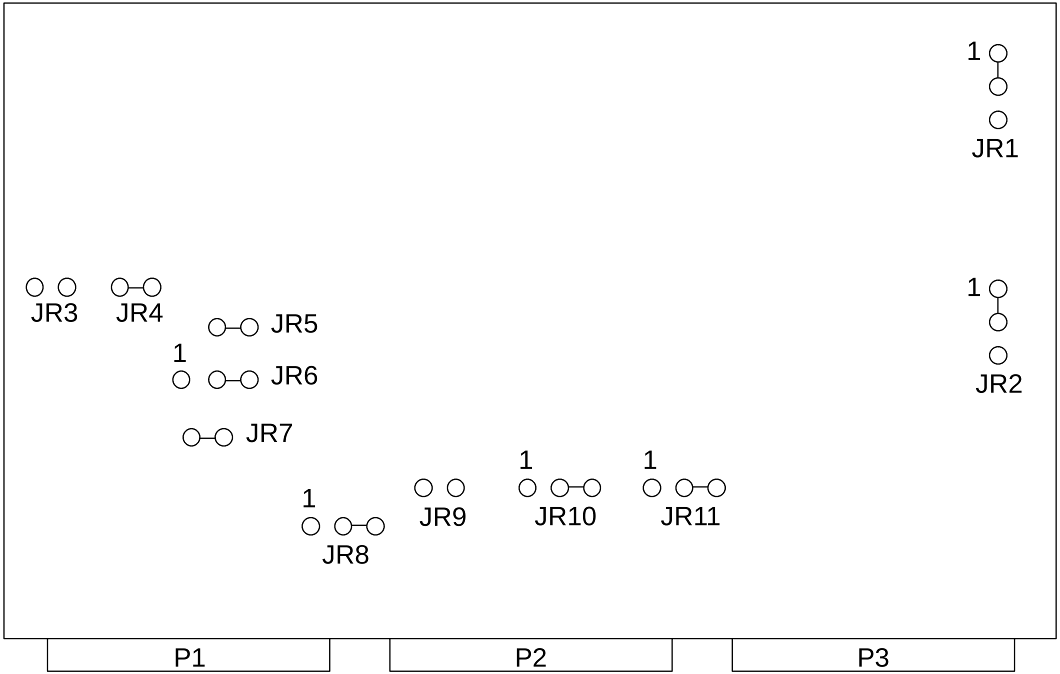
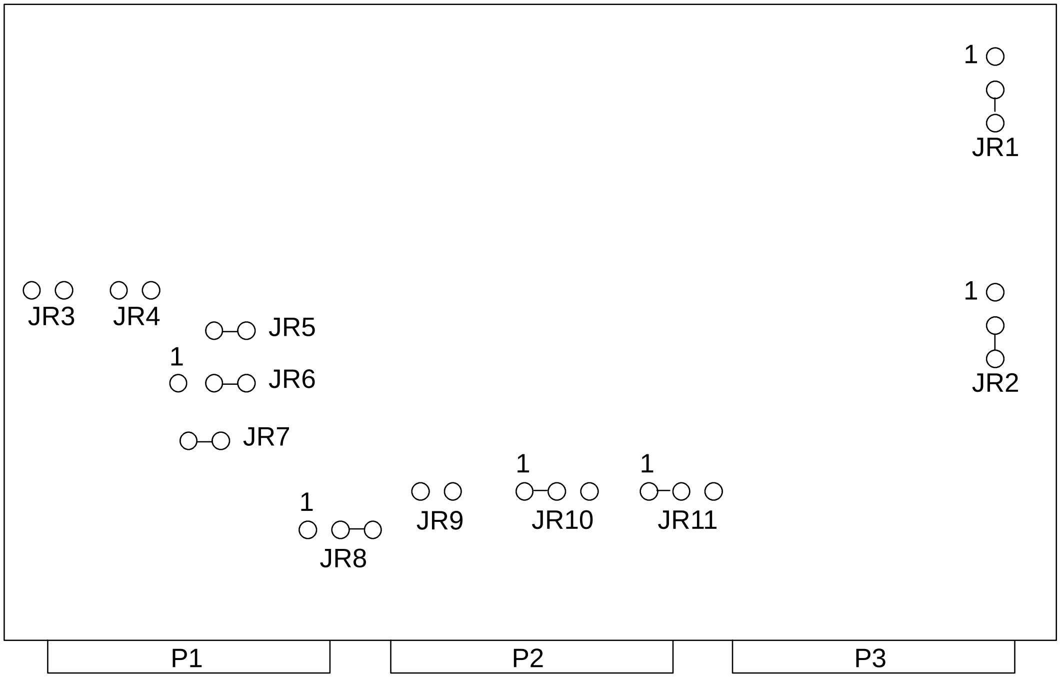


Image Memory PCB (64 MB) 7500-0569-03



M-Mode/Physio PCB

Part No.		Replacement Levels						Features		Notes
		14.13 and up						Old MB	New MB	
112-25337	07	A						Y	N	
7500-0671	01	–						Y	N	
	02	C						Y	Y	
	04	R						Y	Y	
	05	A						Y	Y	1

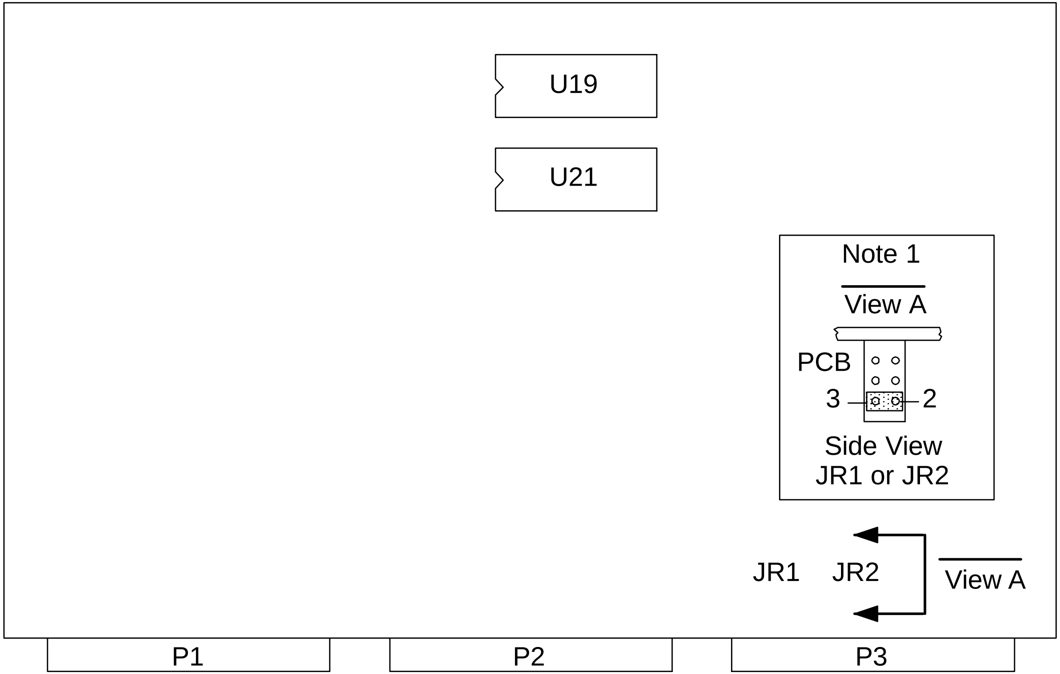
1. The 7500-0671-05 PCB will cause an erroneous bootup status, which should be ignored.

PROMs

Part No.		PROM Kit Part No.		Replacement Levels 14.13 and up					Location, P/N, Dash		
112-25337 7500-0671	07 01 02 04 05	8000-0699	03	R					U19[1]	4201-0725	02
									U21[2]	4201-1219	02

1. Check Sum: 20C8 Firmware Address: A5
2. Check Sum: EBDF Firmware Address: A6

M-Mode/Physio PCB 112-25337-07/7500-0671-01/02/04/05



Note 1: JR1 and JR2 located only on 112-25337-07 PCB.

Motor Controller PCB

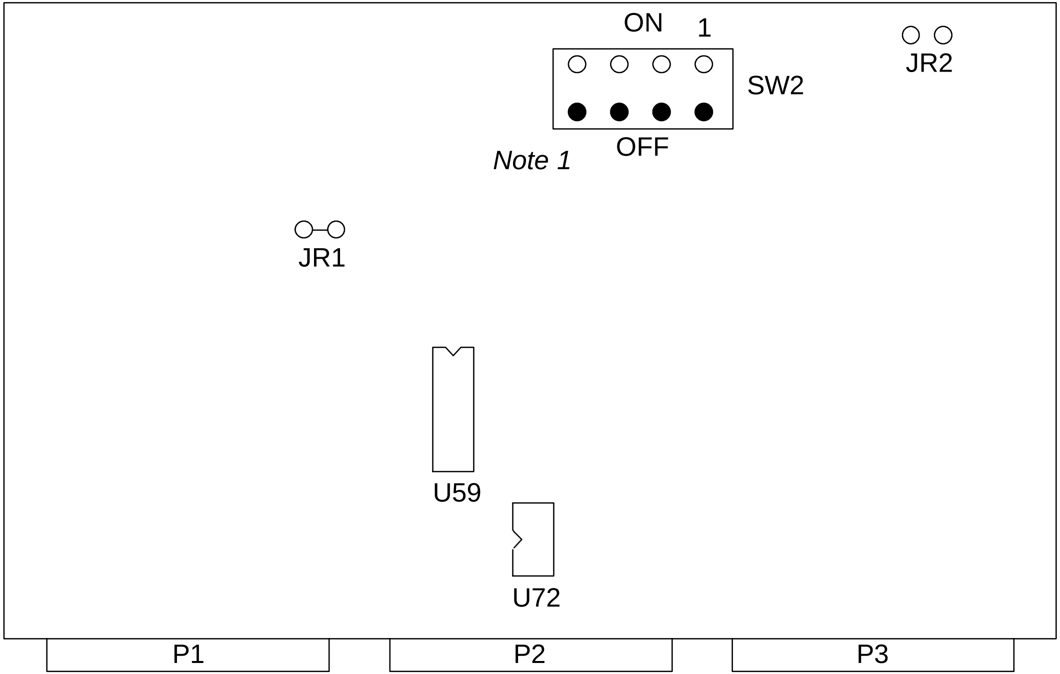
Part No.		Replacement Levels						Features		Notes
		14.13 and up						A6-3		
7500-0617	03	C						Y		
	04	R						Y		

PROMs

Part No.		PROM Kit		Replacement Levels					Location, P/N, Dash		
		Part No.		14.13 and up							
7500-0617	03 04	8000-0887	02	R					U59[1]	4201-1558	01
									U72[2]	4201-1164	04

1. Check Sum: 6E63 Firmware Address: None
2. Check Sum: 02AD Firmware Address: 58

Motor Controller PCB 7500-0617-03/04



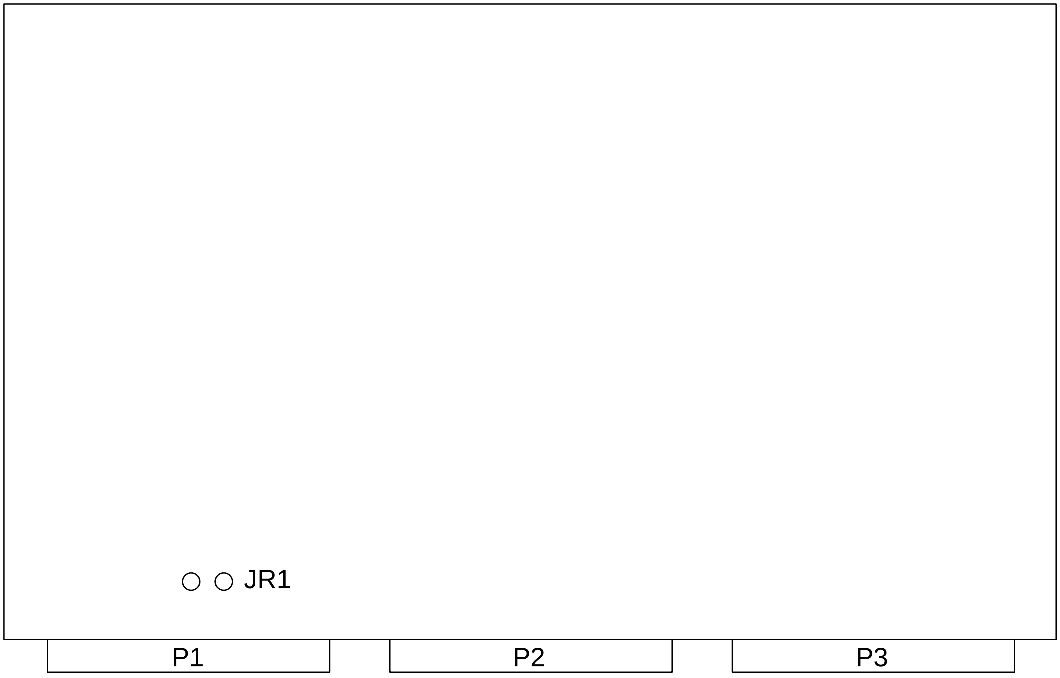
Note 1: Press on the “d” to set each switch position.

Scan Converter Dual Buffer Memory PCB

Part No.		Replacement Levels					Features			Notes
		14.13 and up								
7500-0558	01	A								
	02	R								

NOTE: There are no PROMs for the S.C. Dual Buffer Memory PCB.

Scan Converter Dual Buffer Memory PCB 7500-0558-01

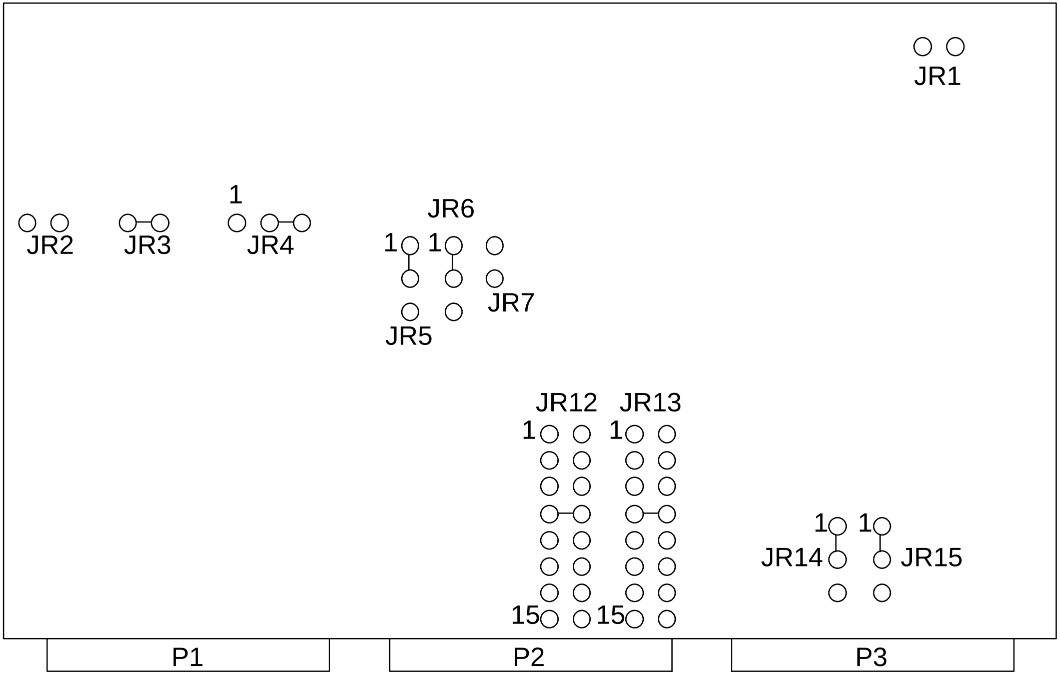


Scan Converter Interface PCB (B/W)

Part No.		Replacement Levels					Features			Notes
		14.13 and up					Image Vue			
7500-0557	02	R					Y			

NOTE: There are no PROMs for the S.C. Interface PCB.

Scan Converter Interface PCB (B/W) 7500-0557-02

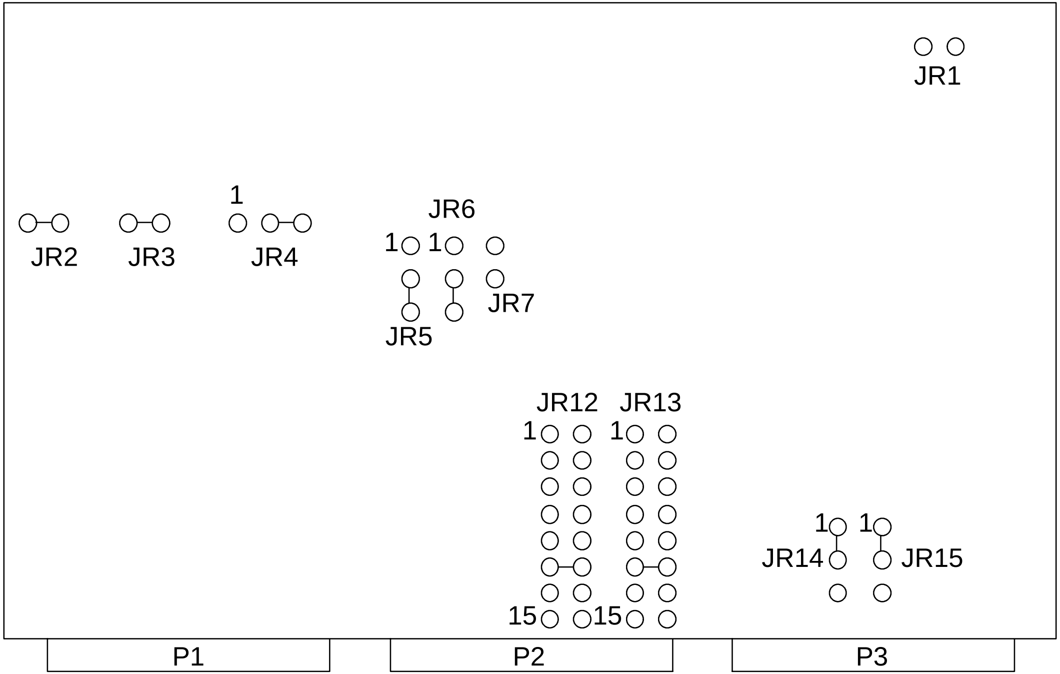


Scan Converter Interface PCB (Color)

Part No.		Replacement Levels					Features			Notes
		14.13 and up					Image Vue			
7500-0557	02	R					Y			

NOTE: There are no PROMs for the S.C. Interface PCB.

Scan Converter Interface PCB (Color) 7500-0557-02



Scan Converter Output Address Generator PCB (B/W)

Part No.		Replacement Levels					Features		Notes
		14.13 and up							
7500-0499	04	A							
	05	R							Supports 10-bit memory page

NOTE: There are no PROMS or jumpers for the Scan Conv. OAG.

Scan Converter Output Address Generator PCB (Color)

Part No.		Replacement Levels					Features		Notes
		14.13 and up							
7500-0499	04	A							
	05	R							Supports 10-bit memory page

NOTE: There are no PROMs or jumpers for the Scan Conv. OAG.

Scrolling Graphics Display PCB

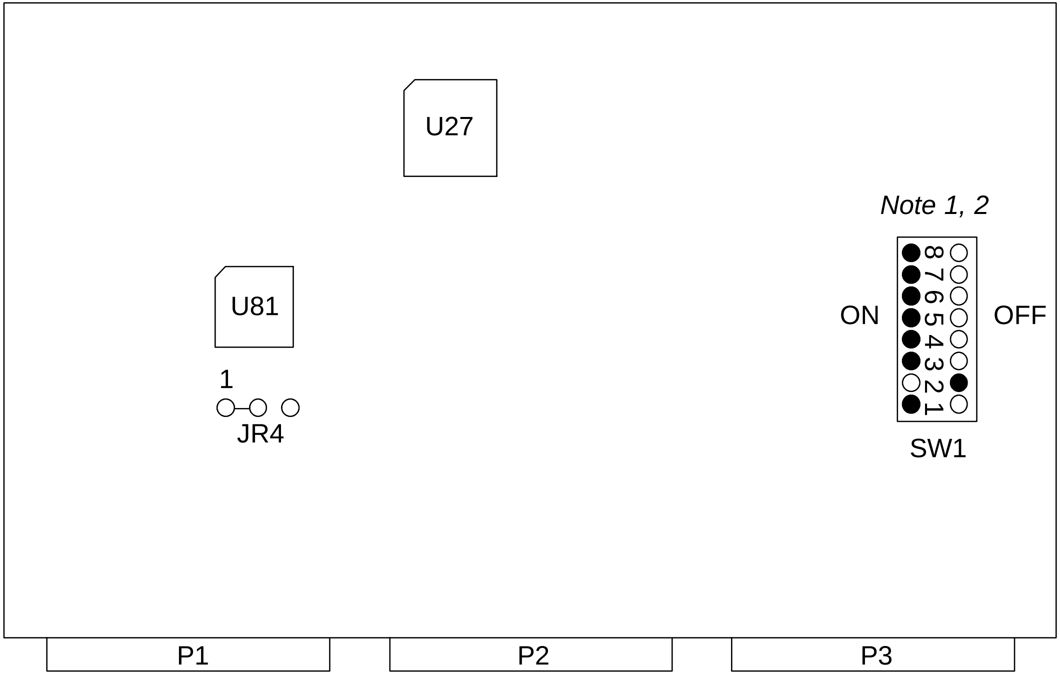
Part No.		Replacement Levels					Features		Notes
		14.13 and up							
7500-0864	01	C							
	03	R							
	05	R							
	06	R							

PROMs

Part No.		PROM Kit Part No.		Replacement Levels 14.13 thru 16.01	17.05 and up				Location, P/N, Dash		
7500-0864	01 03 04 05 06	8000-0918	06	–					U27[1]	4201-1535	12
									U81[2]	4201-1536	04
			07	R					U27[3]	4201-1535	13
									U81[2]	4201-1536	04
		8000-1085	01	–	R				U27[3]	4201-1771	01
									U81[2]	4201-1536	04

1. Check Sum: DD45 Firmware Address: A9
2. Check Sum: A0CC Firmware Address: None
3. Check Sum: EDDF Firmware Address: A9

Scrolling Graphics Display PCB 7500-0864-01/03/04/05/06



Note 1: Press on the "d" to set each switch position.

Note 2: Set SW1-1 to ON for PAL systems

Spectral Estimator PCB

Part No.		Replacement Levels					Features		Notes
		14.13 and up						Dop Power Imaging	
7500-0382	10	A						Y	Made from -08
	11	R						Y	
	12	R						Y	
	63	C						Y	Made from -05[1]
	64	A						Y	Made from -06
	65	C						Y	Made from -07[1]

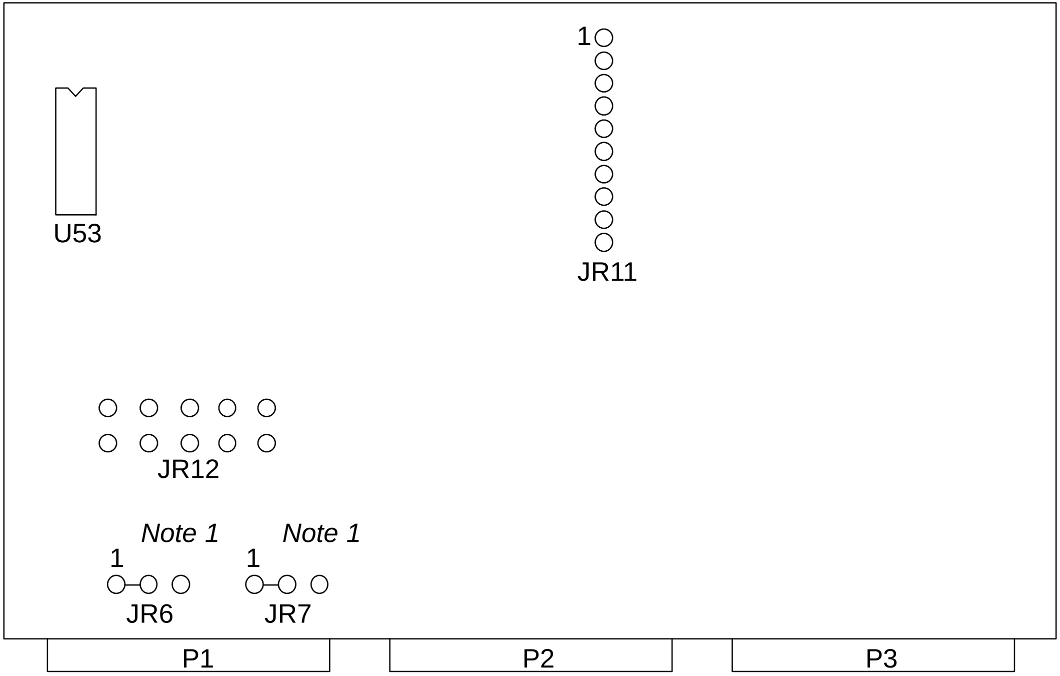
1. Field Mod PCB only. N/A from the factory.

PROMs

Part No.		PROM Kit Part No.		Replacement Levels 14.13 and up					Location, P/N, Dash		
7500-0382	10 11 12 63 65 64	8000-0917	02	R					U53[1]	4201-1538	02

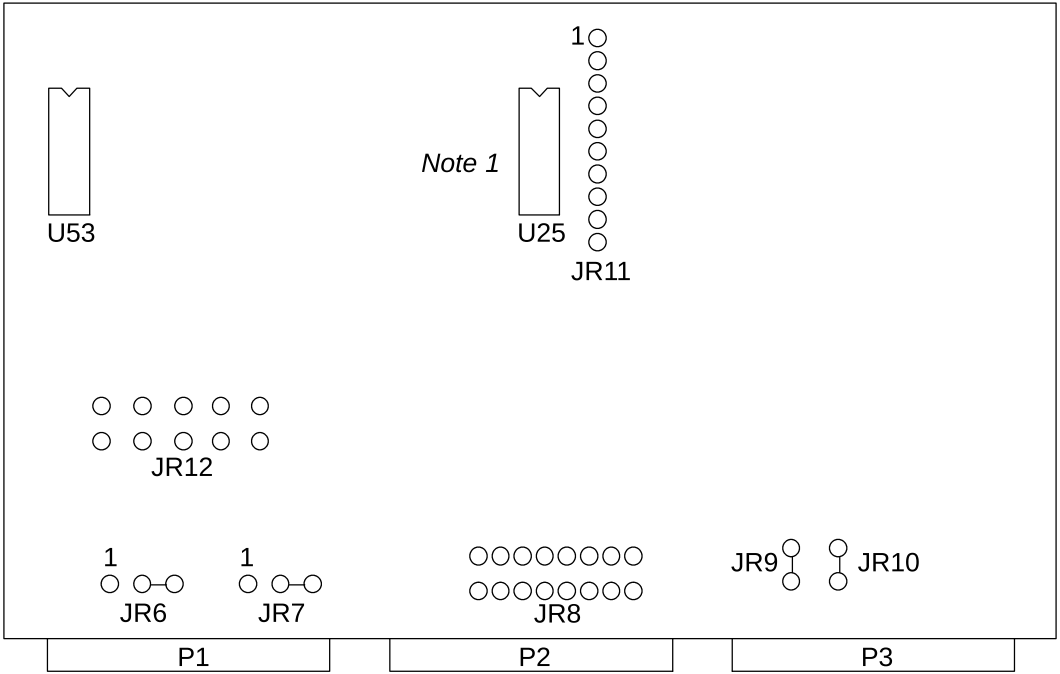
1. Check Sum: 61B1 Firmware Address: A3

Spectral Estimator PCB 7500-0382-06/07/63/64/65



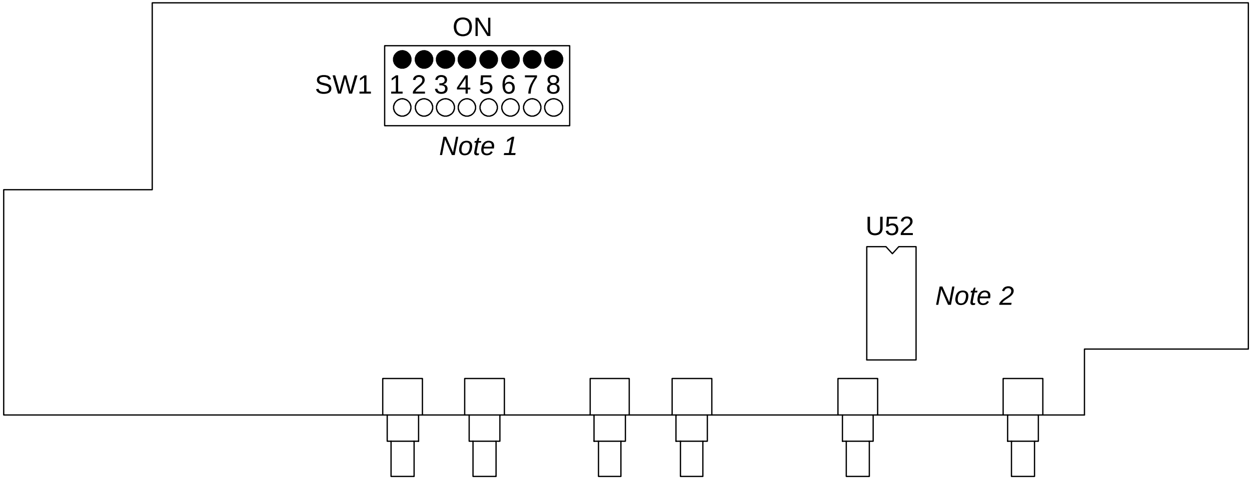
Note 1: The -06 and -07 PCBs have pin 1 of JR6 and JR7 reversed. It is the upper pin on the -06 and the lower pin on the -07. Jumper pins 2–3 in all cases (pins 2–3 = lower pins on the -06 and upper pins on the -07).

Spectral Estimator PCB 7500-0382-08/10/11/12



Note 1: U25 is for Doppler Power Imaging. It is not included in the PROM kit.

Rear Panel PCB 7500-0676-03

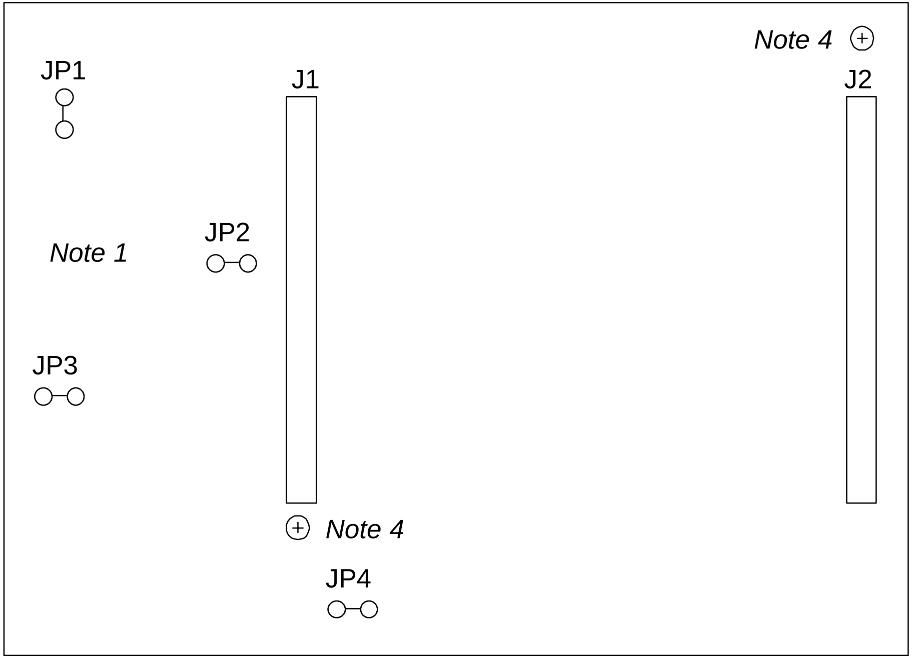


NOTE: There are no PROMs for the Rear Panel PCB.

Note 1: Press on the “d” to set each switch position.

Note 2: U52 must be removed from 7500-0676-03 when VED PCB is installed.

Video Encoder/Decoder PCB 7500-0758-03/04



Note 1: Install JP1 through JP4 for NTSC systems. Remove JP1 through JP4 for PAL systems.

Note 2: The VED PCB replaces the VFC PCB.

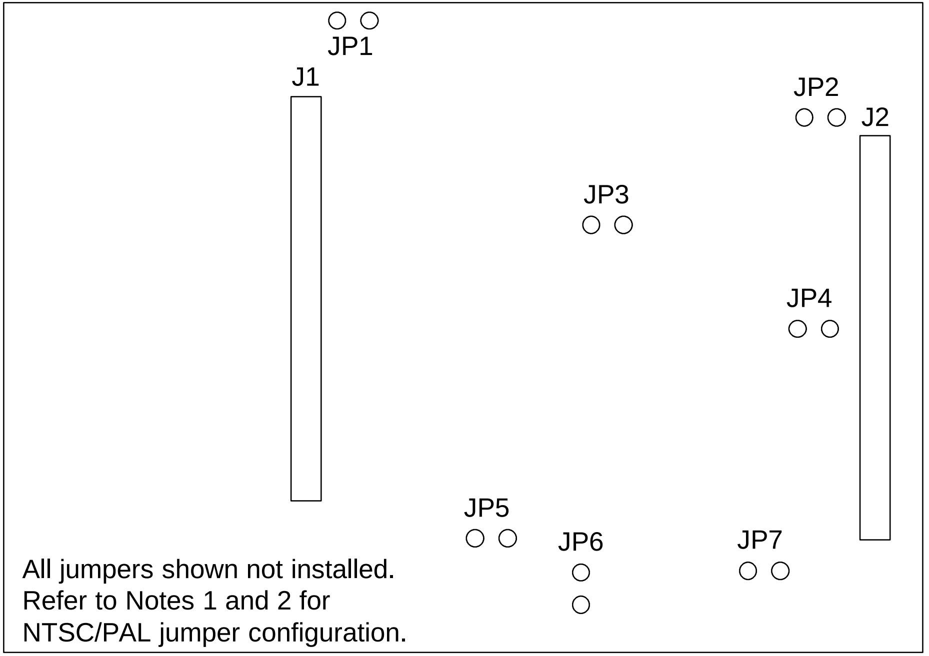
Note 3: Verify that U52 is removed from the Rear Panel PCB (7500-0676) when installing this PCB.

Note 4: Indicates screw location. Verify two nylon washers are installed between the VED PCB and the standoff on the Rear Panel PCB (7500-0676-03) for each screw location.

Video Format Converter PCB 7500-0506-08 (PAL), 7500-0506-09 (NTSC)

Note 1: Install JP1 1–2, JP3 2–3, and JP6 1–2 for NTSC PCBs. All other jumpers are not installed.

Note 2: Install JP3 1–2 for PAL PCBs. All other jumpers are not installed.


JP1
J1
JP2
J2
JP3
JP4
JP5
JP6
JP7
All jumpers shown not installed.
Refer to Notes 1 and 2 for
NTSC/PAL jumper configuration.

Miscellaneous PCBs and Assemblies

NOTE: With the exception of jumpers on the VED and VFC PCBs, the PCBs and assemblies in the following table have no jumpers or PROMs.

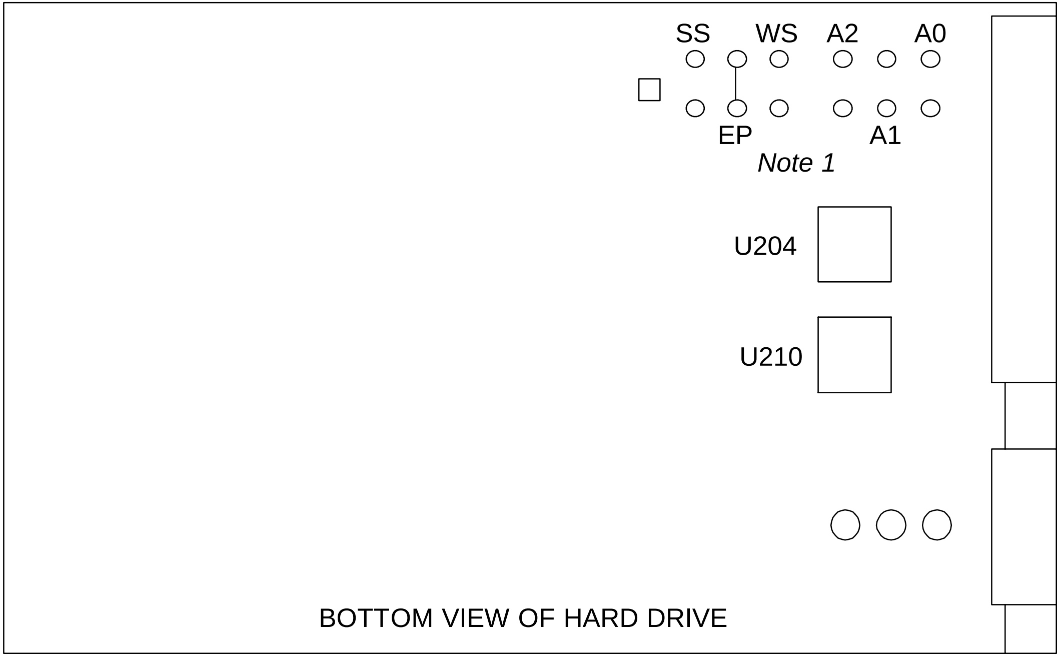
Name	Part No.		Replacement Levels		Notes
			14.13 and up		
Scanhead Select	7500-0629	04	L		Not for biplane or multiplane TEE
		05	C		Not for biplane or multiplane TEE
		06	L		Biplane and multiplane TEE compatible. The -06 may be used in place of the -04, but not the -04 in place of the -06.
		07	L		Biplane and multiplane TEE compatible.
Scanhead Select Daugh-terboard	7500-0636	04	–		Not for biplane or multiplane TEE
		06	L		Biplane and multiplane TEE compatible. The -06 may be used in place of the -04, but not the -04 in place of the -06.
Backplane Motherboard	7500-0588	02	L		Also known as “old motherboard”

Name	Part No.		Replacement Levels 14.13 and up		Notes
Backplane Motherboard	7500-0677	01 02	L		Also known as “new motherboard”
ECG Isolation	3500-1319	01	R		
Pulser Power Supply	3500-1131	03	R		
Rear Panel Assy, PAL	3500-1256	01	–		All switches open
		02	R		
Rear Panel Assy, NTSC	3500-1257	01	–		All switches open
		02	R		

Name	Part No.		Replacement Levels		Notes
			14.13 and up		
Rear Panel Assy, NTSC/ PAL	3500-1511	01 02	A		NTSC/PAL configured with jumpers on VED PCB
Rear Panel PCB, NTSC/PAL	7500-0676	01	C		
		02	R		
		03	L		Use only with 7500-0758 VED PCB
Tact Switch	7500-0436	05	L		
		06	L		Use on 3500-1520/1521 control panel
		07	L		
Mode Switch	7500-0441	04	R		
Trackball Switch	7500-0442	02	R		
Video Encoder/ Decoder (VED)	7500-0758	03 04	L		Used on 7500-0676-03 only. JP1 – JP4 installed for NTSC systems and not installed for PAL systems
Video Format Converter (VFC)	7500-0506	08	L		PAL, JP5 open
		09	L		NTSC, JP5 open

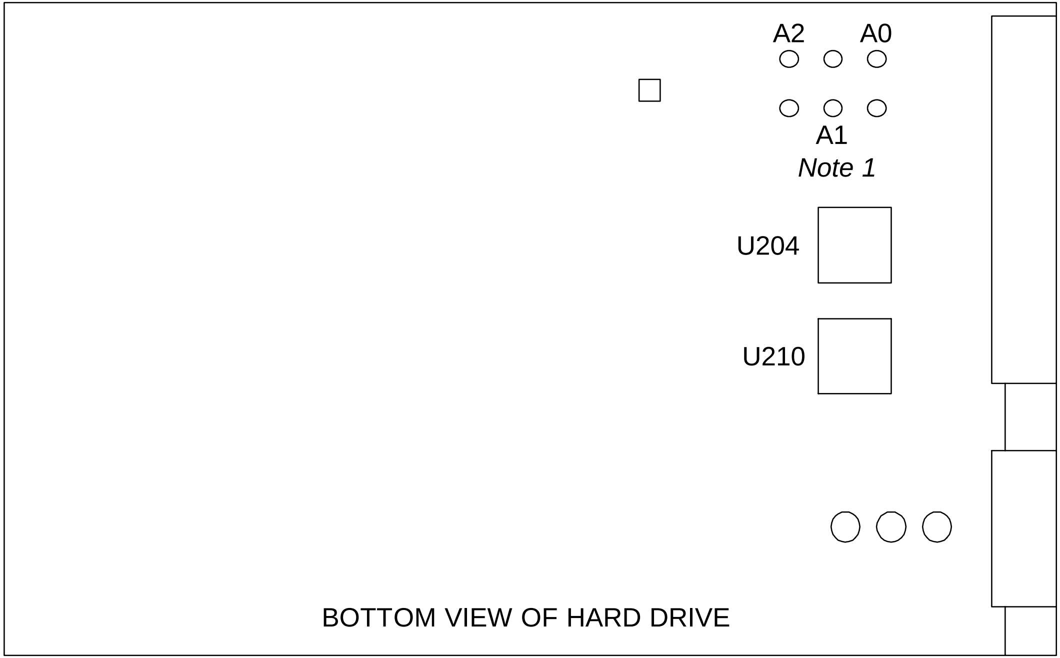
Name	Part No.		Replacement Levels 14.13 and up		Notes
Audio Buffer	7500-0433	04	–		
		05	–		
		06	R		
Fan Speed Controller	2100-0679	01	R		

Hard Drive PCB Jumper Locations (52 MB Drive – P/N 2100-0713-01)



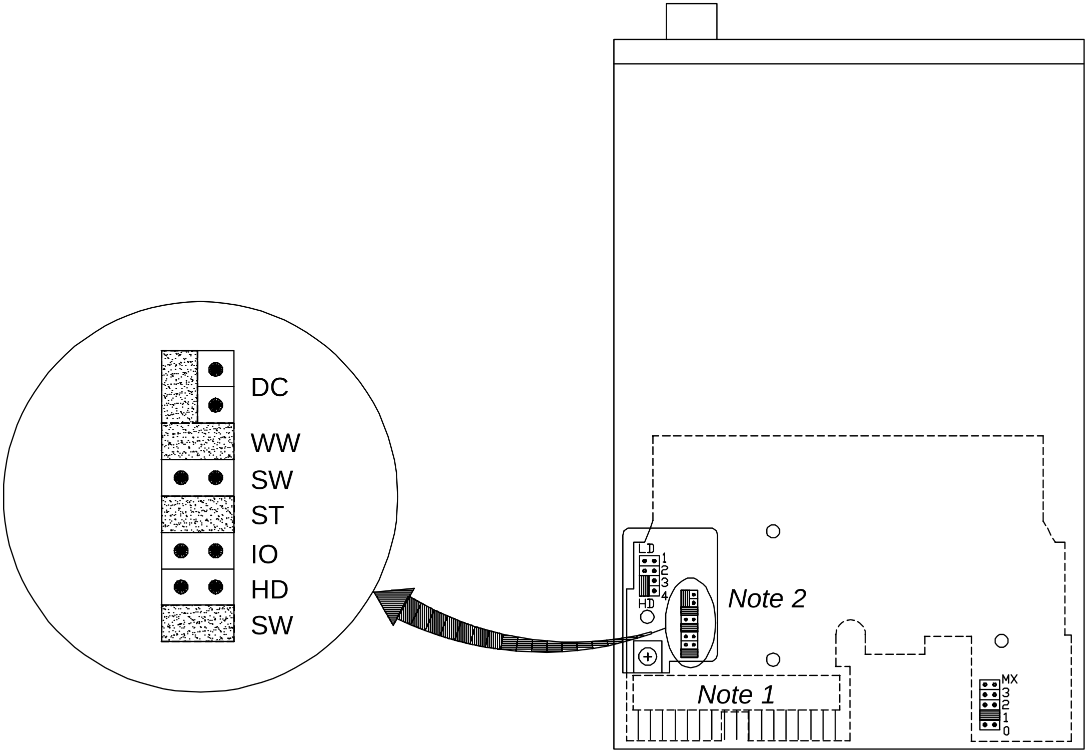
Note 1: The 42 MB (P/N 2100-0757-01), 85 MB (P/N 2100-0758-01), and 170 MB (P/N 2100-0832-01) drives are not shown. These drives have three jumpers (A0, A1, and A2) without jumper headers installed.

Hard Drive PCB Jumper Locations (40 MB Drive – P/N 2100-0547-01)



Note 1: The 42 MB (P/N 2100-0757-01), 85 MB (P/N 2100-0758-01), and 170 MB (P/N 2100-0832-01) drives are not shown. These drives have three jumpers (A0, A1, and A2) without jumper headers installed.

Floppy Drive PCB Jumper Locations 2100-0529-01/02 2100-0726-01



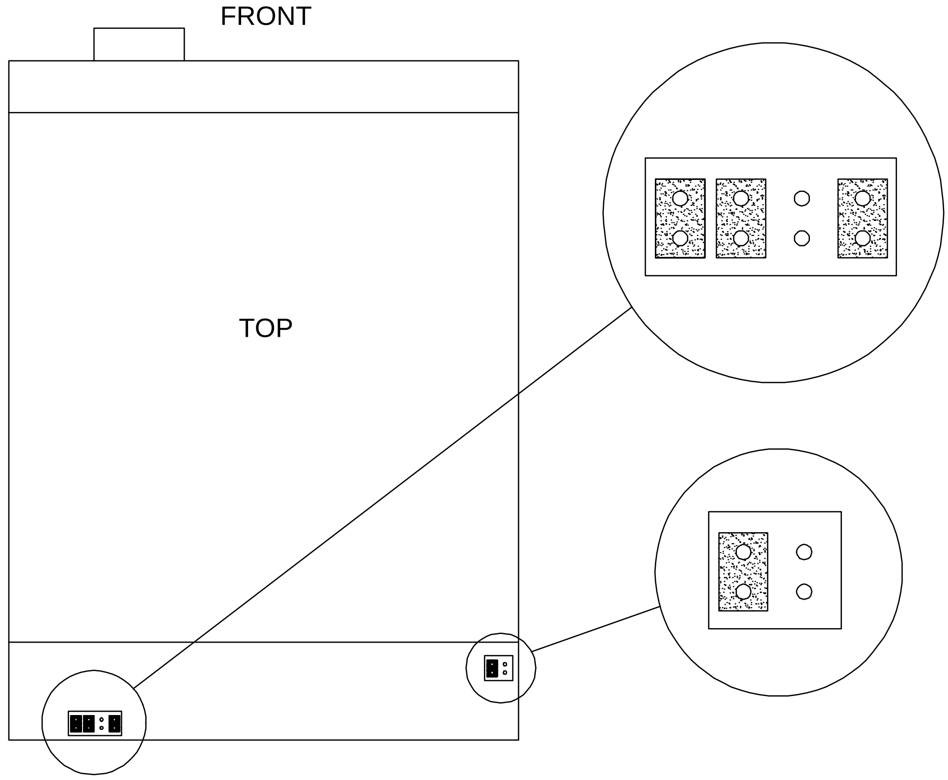
HDI–5C–101

Note 1: On drive 2100-0529-01/02 cable key must be down on the drive end or drive will not work. On drive 2100-0726-01 cable key must be up.

Note 2: Shaded areas indicate jumper positions.

Note 3: Part number 2100-0529-01 = vendor part number MF355B–12UJ, or MF355BA–12U, or MF355BA-12UJ.
Part number 2100-0529-02 = vendor part number
Part number 2100-0726-01 = vendor part number MF355C–712UJ

Floppy Drive PCB Jumper Locations 2100-0793-01



Note 1: Shaded areas indicate jumper positions.

HDI–5C–104

Note 2: Align the data cable using the pin 1 locator on the cable and disk drive. The drive will not function if the data cable is not connected properly. No damage to the system or drive will result.

Note 3: Part number 2100-0793-01 = vendor part number MF355F–252UG.

5D Scanhead Compatibility

Table 5D–1. UM-9 HDI Scanhead Compatibility Matrix

Scanhead Type/ Scanhead Name	Part No.		Bkwd. Comp.	Fwd. Comp.	ESP Avail.[1]	Hardware Notes	S/W Comp.
PHASED ARRAY							
P7 8mm 7 MHz 64 Ele.	4000-0251	-02	-01		N		8.36
P3.5 28mm 3.5 MHz 128 Ele.	4000-0279	-02	-01		N	Replaces 4000-0253-01	8.36
P3–2 20 mm 2.5 MHz 64 Ele.	4000-0287	-03	-01, -02		Y, N		10.38
TEE 5.0 BP 5 MHz	4000-0288	-02	-01		N		10.44A
TEE 5.0 MP 5 MHz 64 Ele.	4000-0317	-02	-01		N	Requires ESP system	10.44A
P5–3 3.5 MHz 64 Ele.	4000-0316	-03			Y, N		13.18A

Scanhead Type/ Scanhead Name	Part No.		Bkwd. Comp.	Fwd. Comp.	ESP Avail.[1]	Hardware Notes	S/W Comp.
P7–4 5 MHz 64 Ele.	4000-0322	-01			Y, N		15.X
LINEAR ARRAY							
L5 38mm HRS 5.0 MHz 128 Ele.	4000-0259	-04	-01, -02		N		8.36
L10–5 38mm HRLA 7.5 MHz 192 Ele. L10–5 (cost reduced)	4000-0263 4000-0333	-03 -02	-01, -02 -01		Y, N		8.36
L7–4 LA 5.0 MHz 128 Ele.	4000-0318	-03	-01		Y, N		12.06
CURVED ARRAY							
C3 40R CNX 3.0 MHz 128 Ele.	4000-0255	-02	-01		N		8.36
C3.5 76R CNX 3.5 MHz 128 Ele.	4000-0256	-06	-03, -02, -01		N		8.36
C5 40R CNX 5.0 MHz 128 Ele.	4000-0254	-02	-01		N		8.36

Scanhead Type/ Scanhead Name	Part No.		Bkwd. Comp.	Fwd. Comp.	ESP Avail.[1]	Hardware Notes	S/W Comp.
C5 IVT 5.0 MHz 114 Ele.	4000-0260	-04	-03, -02, -01		N		8.36
CVA C9–5 ICT 128 Ele.	4000-0280	-06	-04, -03, -02, -01		Y, N		8.79B
C7–4 40R 5.0 MHz 128 Ele.	4000-0301	-02	-01		Y, N		12.06
C4–2 3.0 MHz 128 Ele.	4000-0320	-02	-01		Y, N		13.18C
CL10–5 7.5 MHz 128 Ele.	4000-0315	-02			Y, N	Requires ESP system	18.X
WIDE APERTURE ANNULAR ARRAY							
AA A6–3 4.0 MHZ 8 Ele.	4000-0283	-02	-01		Y, N		8.73C/ 8.75
STATIC CW							
D2 CW 2.25 MHz	4000-0307 2100-0674	-03 -02	-01, -02		NA	2	10.38
D5 CW 5.0 MHz	4000-0308 2100-0675	-01 -01			NA	2	10.38

Scanhead Type/ Scanhead Name	Part No.		Bkwd. Comp.	Fwd. Comp.	ESP Avail.[1]	Hardware Notes	S/W Comp.
D10 CW 10 MHz	4000-0309 2100-0676	-01 -01			NA	2	10.38
D2 TC 2.0 MHz	4000-0310 2100-0684	-02 -02	-01		NA	2	10.38

1. This column refers to whether ESP functions may be used on ESP systems with these particular scanheads.
2. The 4000 numbers refer to part numbers of tested (validated) scanheads. The 2100 numbers refer to part numbers of scanheads that have not been validated. Both part numbers are listed here because some scanheads in the field have the 2100 numbers and some have the 4000 numbers. Use the 4000 numbers to order replacement scanheads.

Table 5D–2. UM-9 HDI Biopsy Guide Compatibility Matrix

Biopsy Guide	Part No.	Dash No.	Bkwd. Comp.	Fwd. Comp.	Hardware Notes	S/W Comp.
Biopsy Guide Adapter L5, 38 mm, 5 MHz	1065-1910	-02				8.73C/ 8.75
Biopsy Guide Adapter L10–5, 38 mm, 7.5 MHz	1065-1908	-02				8.73C/ 8.75
Biopsy Guide Adapter C3.5, 76R, 3.5 MHz	1065-1907	-02				8.73C/ 8.75
Biopsy Guide Adapter C5, 40R, 5 MHz	1065-1909	-02				8.73C/ 8.75
Biopsy Guide Adapter, ICT C9–5	1065-1811	-02				8.73C/ 8.75
Instrument Guide Assy, Mercury/WAAA-SS	3075-0012	-01				8.73C/ 8.75
Instrument Guide Assy, Mercury/WAM-SS	3075-0012	-02				8.73C/ 8.75

6 Operating Notes

OPERATING NOTES

Build Version: v21413 **Rev A June 6, 1994**

These notes are informational; they are included here to clarify certain system responses that might cause operator misunderstanding or difficulty.

System Controls

Movement of the M-line, during 2D Doppler or 2D Color Doppler, while in the 2D acquisition mode can cause a momentary radial line artifact to appear in the 2D image.

PAL video systems only: During VCR playback, the DOPPLER GAIN rotary control does NOT adjust the tint of the color VCR playback display.

2D

ECG and heart rate graphics are displayed on recalled images to which they have no relation. The graphics do not relate to the recalled images and should not be used in connection with the recalled images for any purpose.

The scanhead orientation marker disappears during 2D save-recall. The scanhead orientation marker will reappear after leaving 2D save-recall and changing the image display using the 2D controls.

The gray bar on the black-and-white monitor disappears during 2D save-recall. To recover the gray bar, a mode change is required.

If a “white line” artifact appears at the bottom of the L7–4 linear display, then increase the frame rate or line density to their maximum values to eliminate it.

The system no longer supports the 4-on-1 save-recall image format.

Using dual Cineloop r review to acquire short Cineloop sequences may result in a mix of image sequences in the Cineloop memory buffer. A mix of image sequences, possibly scaled differently or acquired at different depths, could result in erroneous measurements. During dual Cineloop review, an image sequence that exhibits a broken or abnormal appearance indicates this phenomenon. Do not use images from Cineloop sequences that contain images that exhibit this quality. If you experience the phenomenon described here with dual Cineloop review, increase the length of the Cineloop sequences

that you acquire. Increasing the length of the Cineloop sequence will ensure that the data in the Cine-loop memory buffer is consistent and properly scaled.

In split-screen M-mode or Doppler, be sure to use the correct measurement cursor for the display type on which you are measuring. Separate measurement cursors are available for 2D and for M-mode and Doppler. The 2D cursor is a +, and the M-mode and Doppler cursor is a + with dotted horizontal and vertical lines through it. To make measurements on the 2D image in split-screen mode, press *2D Calcs*, *2D Dist(s)*, or *2D Area(s)*. Using M-mode or Doppler cursors to make 2D measurements on the 2D image will cause measurement errors. Likewise, using 2D cursors on M-mode or Doppler displays to make M-mode or Doppler measurements will also cause measurement errors.

Doppler

In simultaneous mode, 2D and spectral Doppler, a buzz can be heard in the Doppler audio.

In simultaneous mode, 2D and spectral Doppler, with PRF set at 8333 Hz and the Wall Filter set to 50 Hz, bright spikes appear at the zero baseline. To eliminate the bright spikes at the zero baseline, reduce the PRF or change the Wall Filter setting.

In simultaneous mode, 2D and spectral Doppler, with a P3.5 28mm, PRF set at 3704 Hz or lower, and the 2D Depth at 7.8 cm, bright spikes appear at the zero baseline. To eliminate the bright spikes at the zero baseline, change the PRF.

In steered CW Doppler, the CW line may not always go to the edge of the sector when the TRACKBALL is moved quickly and in the direction of the scanhead orientation marker.

If the Doppler display is unfrozen while in Doppler review, the High Q t Automatic Doppler Analysis peak and mean traces will be erased. To display the peak and mean traces, press FRZ and move the TRACKBALL.

Color

When Color M-mode is active, and at a high sweep speed, the color portion of the display may not scroll as smoothly as the gray scale portion. To correct this situation, select a slower sweep speed.

The color bar annotation can be erased during Color M-mode analysis. To recover from this situation, press FRZ twice.

Random flashes of erroneous color data can occur while adjusting the color overlay position. The flashes will stop after the color overlay position has been adjusted.

In 2D Color at maximum sector depth, with a color PRF below 1500 Hz, a ribbon of color may appear at the bottom of the color overlay. Reduce the height of the color overlay size to increase the color PRF and eliminate this artifact.

During scrolling in Color M-mode at a depth of 13.7 cm, a band of color radial lines will appear on the display.

Selecting a different scanhead during 2D Color Doppler acquisition, and then selecting 2D only mode will result in a 2D image with multiple focal zones. Do not select a different scanhead from 2D Color Doppler. Before selecting a different scanhead, select 2D only mode, and then select a scanhead.

During non-scrolling simultaneous 2D Color Doppler, color spikes are visible at varying depths. To eliminate the color spikes, press DOP to start scrolling, or select 2DRES, using *HighFR/High Res*.

Using either the C7–4 or the C5 40R scanhead, at a maximum 2D depth of 13.7 cm, scrolling Color M-mode will result in a band of inaccurate color data about .5 cm in width at the bottom of the Color M-mode display.

Transducer Select

Selecting the L10–5 during 2D only mode results in a smaller 2D gain value than selecting the L10–5 from 2D color Doppler mode. Adjust 2D GAIN as required.

Setup

In 2D save-recall, the heart rate that is displayed is not related to the save-recall image; the displayed heart rate is the current heart rate. Additionally, recalling a 2D color image erases the HEART RATE annotation, leaving only the heart rate value. A system mode change will correct both heart rate discrepancies.

In split screen Doppler, with the 2D image inverted, the graphics on the color video monitor can be hard to read. To correct this situation, use a normal 2D image or turn off the split screen display.

PAL video systems, English only: To set the date always enter month, day, and year. When you enter the date, verify that the correct date is displayed on the video monitor.

OB, GYN and Fertility Analysis

Any age or estimated date of delivery (EDD) determined by last menstrual period (LMP) occurring in a leap year (1992, 1996,...) may be inaccurate by a day.

VCR

With an external VCR and an external color printer, color prints of some recorded displays from VCR record-pause result in loss of sync, which causes scrambled graphics. If this situation occurs, to eliminate the scrambled graphics, initiate the print from VCR playback–pause.

The system no longer supports the VCR patient directory or the freeze-frame functions.

Transcranial Doppler

Changing the sample volume depth during transcranial Doppler acquisition, and then using Doppler review can result in display annotation that does not match the spectral review data. Ensure that the Doppler review display annotation matches the spectral review data: if possible, do not change the sample volume depth while acquiring the Doppler review data, but if it is necessary, then ensure that you understand the consequences of this change and are aware of the effects upon the display.

OPERATING NOTES

Build Version: v21500 **Rev A July 26, 1994**

These notes are informational; they are included here to clarify certain system responses that might cause operator misunderstanding or difficulty.

System Controls

Movement of the M-line, during 2D Doppler or 2D Color Doppler, while in the 2D acquisition mode can cause a momentary radial line artifact to appear in the 2D image.

PAL video systems only: During VCR playback, the DOPPLER GAIN rotary control does NOT adjust the tint of the color VCR playback display.

2D

ECG and heart rate graphics are displayed on recalled images to which they have no relation. The graphics do not relate to the recalled images and should not be used in connection with the recalled images for any purpose.

The scanhead orientation marker disappears during 2D save-recall. The scanhead orientation marker will reappear after leaving 2D save-recall and changing the image display using the 2D controls.

The gray bar on the black-and-white monitor disappears during 2D save-recall. To recover the gray bar, a mode change is required.

If a “white line” artifact appears at the bottom of the L7–4 linear display, then increase the frame rate or line density to their maximum values to eliminate it.

The system no longer supports the 4-on-1 save-recall image format.

Using dual Cineloop r review to acquire short Cineloop sequences may result in a mix of image sequences in the Cineloop memory buffer. A mix of image sequences, possibly scaled differently or acquired at different depths, could result in erroneous measurements. During dual Cineloop review, an image sequence that exhibits a broken or abnormal appearance indicates this phenomenon. Do not use images from Cineloop sequences that contain images that exhibit this quality. If you experience the phenomenon described here with dual Cineloop review, increase the length of the Cineloop sequences

that you acquire. Increasing the length of the Cineloop sequence will ensure that the data in the Cineloop memory buffer is consistent and properly scaled.

In split-screen M-mode or Doppler, be sure to use the correct measurement cursor for the display type on which you are measuring. Separate measurement cursors are available for 2D and for M-mode and Doppler. The 2D cursor is a +, and the M-mode and Doppler cursor is a + with dotted horizontal and vertical lines through it. To make measurements on the 2D image in split-screen mode, press *2D Calcs*, *2D Dist(s)*, or *2D Area(s)*. Using M-mode or Doppler cursors to make 2D measurements on the 2D image will cause measurement errors. Likewise, using 2D cursors on M-mode or Doppler displays to make M-mode or Doppler measurements will also cause measurement errors.

Doppler

In simultaneous mode, 2D and spectral Doppler, a buzz can be heard in the Doppler audio.

In simultaneous mode, 2D and spectral Doppler, with PRF set at 8333 Hz and the Wall Filter set to 50 Hz, bright spikes appear at the zero baseline. To eliminate the bright spikes at the zero baseline, reduce the PRF or change the Wall Filter setting.

In simultaneous mode, 2D and spectral Doppler, with a P3.5 28mm, PRF set at 3704 Hz or lower, and the 2D Depth at 7.8 cm, bright spikes appear at the zero baseline. To eliminate the bright spikes at the zero baseline, change the PRF.

In steered CW Doppler, the CW line may not always go to the edge of the sector when the TRACKBALL is moved quickly and in the direction of the scanhead orientation marker.

If the Doppler display is unfrozen while in Doppler review, the High Q t Automatic Doppler Analysis peak and mean traces will be erased. To display the peak and mean traces, press FRZ and move the TRACKBALL.

Color

When Color M-mode is active, and at a high sweep speed, the color portion of the display may not scroll as smoothly as the gray scale portion. To correct this situation, select a slower sweep speed.

The color bar annotation can be erased during Color M-mode analysis. To recover from this situation, press FRZ twice.

Random flashes of erroneous color data can occur while adjusting the color overlay position. The flashes will stop after the color overlay position has been adjusted.

In 2D Color at maximum sector depth, with a color PRF below 1500 Hz, a ribbon of color may appear at the bottom of the color overlay. Reduce the height of the color overlay size to increase the color PRF and eliminate this artifact.

During scrolling in Color M-mode at a depth of 13.7 cm, a band of color radial lines will appear on the display.

Selecting a different scanhead during 2D Color Doppler acquisition, and then selecting 2D only mode will result in a 2D image with multiple focal zones. Do not select a different scanhead from 2D Color Doppler. Before selecting a different scanhead, select 2D only mode, and then select a scanhead.

During non-scrolling simultaneous 2D Color Doppler, color spikes are visible at varying depths. To eliminate the color spikes, press DOP to start scrolling, or select 2DRES, using *HighFR/High Res*.

Using either the C7–4 or the C5 40R scanhead, at a maximum 2D depth of 13.7 cm, scrolling Color M-mode will result in a band of inaccurate color data about .5 cm in width at the bottom of the Color M-mode display.

Transducer Select

Selecting the L10–5 during 2D only mode results in a smaller 2D gain value than selecting the L10–5 from 2D color Doppler mode. Adjust 2D GAIN as required.

Setup

In 2D save-recall, the heart rate that is displayed is not related to the save-recall image; the displayed heart rate is the current heart rate. Additionally, recalling a 2D color image erases the HEART RATE annotation, leaving only the heart rate value. A system mode change will correct both heart rate discrepancies.

In split screen Doppler, with the 2D image inverted, the graphics on the color video monitor can be hard to read. To correct this situation, use a normal 2D image or turn off the split screen display.

PAL video systems, English only: To set the date always enter month, day, and year. When you enter the date, verify that the correct date is displayed on the video monitor.

OB, GYN and Fertility Analysis

Any age or estimated date of delivery (EDD) determined by last menstrual period (LMP) occurring in a leap year (1992, 1996,...) may be inaccurate by a day.

VCR

With an external VCR and an external color printer, color prints of some recorded displays from VCR record-pause result in loss of sync, which causes scrambled graphics. If this situation occurs, to eliminate the scrambled graphics, initiate the print from VCR playback–pause.

The system no longer supports the VCR patient directory or the freeze-frame functions.

Transcranial Doppler

Changing the sample volume depth during transcranial Doppler acquisition, and then using Doppler review can result in display annotation that does not match the spectral review data. Ensure that the Doppler review display annotation matches the spectral review data: if possible, do not change the sample volume depth while acquiring the Doppler review data, but if it is necessary, then ensure that you understand the consequences of this change and are aware of the effects upon the display.

OPERATING NOTES

Build Version: v21601 **Rev B September 16, 1994**

These notes are informational; they are included here to clarify certain system responses that might cause operator misunderstanding or difficulty.

System Controls

Movement of the M-line, during 2D Doppler or 2D Color Doppler, while in the 2D acquisition mode can cause a momentary radial line artifact to appear in the 2D image.

PAL video systems only: During VCR playback, the DOPPLER GAIN rotary control does NOT adjust the tint of the color VCR playback display.

With the annotation function on, if you are able to move the annotation cursor, but you are unable to annotate the display, press ANNOT ON/OFF twice to reset the annotation function.

2D

ECG and heart rate graphics are displayed on recalled images to which they have no relation. The graphics do not relate to the recalled images and should not be used in connection with the recalled images for any purpose.

The scanhead orientation marker disappears during 2D save-recall. The scanhead orientation marker will reappear after leaving 2D save-recall and changing the image display using the 2D controls.

The gray bar on the black-and-white monitor disappears during 2D save-recall. To recover the gray bar, a mode change is required.

If a “white line” artifact appears at the bottom of the L7–4 linear display, then increase the frame rate or line density to their maximum values to eliminate it.

The system no longer supports the 4-on-1 save-recall image format.

Using dual Cineloopr review to acquire short Cineloop sequences may result in a mix of image sequences in the Cineloop memory buffer. A mix of image sequences, possibly scaled differently or acquired at different depths, could result in erroneous measurements. During dual Cineloop review, an image sequence that exhibits a broken or abnormal appearance indicates this phenomenon. Do not use

images from Cineloop sequences that contain images that exhibit this quality. If you experience the phenomenon described here with dual Cineloop review, increase the length of the Cineloop sequences that you acquire. Increasing the length of the Cineloop sequence will ensure that the data in the Cineloop memory buffer is consistent and properly scaled.

In split-screen M-mode or Doppler, be sure to use the correct measurement cursor for the display type on which you are measuring. Separate measurement cursors are available for 2D and for M-mode and Doppler. The 2D cursor is a +, and the M-mode and Doppler cursor is a + with dotted horizontal and vertical lines through it. To make measurements on the 2D image in split-screen mode, press *2D Calcs*, *2D Dist(s)*, or *2D Area(s)*. Using M-mode or Doppler cursors to make 2D measurements on the 2D image will cause measurement errors. Likewise, using 2D cursors on M-mode or Doppler displays to make M-mode or Doppler measurements will also cause measurement errors.

Doppler

In simultaneous mode, 2D and spectral Doppler, a buzz can be heard in the Doppler audio.

In simultaneous mode, 2D and spectral Doppler, with PRF set at 8333 Hz and the Wall Filter set to 50 Hz, bright spikes appear at the zero baseline. To eliminate the bright spikes at the zero baseline, reduce the PRF or change the Wall Filter setting.

In simultaneous mode, 2D and spectral Doppler, with a P3.5 28mm, PRF set at 3704 Hz or lower, and the 2D Depth at 7.8 cm, bright spikes appear at the zero baseline. To eliminate the bright spikes at the zero baseline, change the PRF.

In steered CW Doppler, the CW line may not always go to the edge of the sector when the TRACK-BALL is moved quickly and in the direction of the scanhead orientation marker.

If the Doppler display is unfrozen while in Doppler review, the High Q t Automatic Doppler Analysis peak and mean traces will be erased. To display the peak and mean traces, press FRZ and move the TRACKBALL.

Color

When Color M-mode is active, and at a high sweep speed, the color portion of the display may not scroll as smoothly as the gray scale portion. To correct this situation, select a slower sweep speed.

The color bar annotation can be erased during Color M-mode analysis. To recover from this situation, press FRZ twice.

Random flashes of erroneous color data can occur while adjusting the color overlay position. The flashes will stop after the color overlay position has been adjusted.

In 2D Color at maximum sector depth, with a color PRF below 1500 Hz, a ribbon of color may appear at the bottom of the color overlay. Reduce the height of the color overlay size to increase the color PRF and eliminate this artifact.

During scrolling in Color M-mode at a depth of 13.7 cm, a band of color radial lines will appear on the display.

Selecting a different scanhead during 2D Color Doppler acquisition, and then selecting 2D only mode will result in a 2D image with multiple focal zones. Do not select a different scanhead from 2D Color Doppler. Before selecting a different scanhead, select 2D only mode, and then select a scanhead.

During non-scrolling simultaneous 2D Color Doppler, color spikes are visible at varying depths. To eliminate the color spikes, press DOP to start scrolling, or select 2DRES, using *HighFR/High Res*.

Using either the C7–4 or the C5 40R scanhead, at a maximum 2D depth of 13.7 cm, scrolling Color M-mode will result in a band of inaccurate color data about .5 cm in width at the bottom of the Color M-mode display.

Transducer Select

Selecting the L10–5 during 2D only mode results in a smaller 2D gain value than selecting the L10–5 from 2D color Doppler mode. Adjust 2D GAIN as required.

Setup

In 2D save-recall, the heart rate that is displayed is not related to the save-recall image; the displayed heart rate is the current heart rate. Additionally, recalling a 2D color image erases the HEART RATE annotation, leaving only the heart rate value. A system mode change will correct both heart rate discrepancies.

In split screen Doppler, with the 2D image inverted, the graphics on the color video monitor can be hard to read. To correct this situation, use a normal 2D image or turn off the split screen display.

PAL video systems, English only: To set the date always enter month, day, and year. When you enter the date, verify that the correct date is displayed on the video monitor.

OB, GYN and Fertility Analysis

Any age or estimated date of delivery (EDD) determined by last menstrual period (LMP) occurring in a leap year (1992, 1996,...) may be inaccurate by a day.

VCR

With an external VCR and an external color printer, color prints of some recorded displays from VCR record-pause result in loss of sync, which causes scrambled graphics. If this situation occurs, to eliminate the scrambled graphics, initiate the print from VCR playback–pause.

The system no longer supports the VCR patient directory or the freeze-frame functions.

Transcranial Doppler

Changing the sample volume depth during transcranial Doppler acquisition, and then using Doppler review can result in display annotation that does not match the spectral review data. Ensure that the Doppler review display annotation matches the spectral review data: if possible, do not change the sample volume depth while acquiring the Doppler review data, but if it is necessary, then ensure that you understand the consequences of this change and are aware of the effects upon the display.

OPERATING NOTES

Build Version: v21705 **Rev A October 27, 1994**

These notes are informational; they are included here to clarify certain system responses that might cause operator misunderstanding or difficulty.

System Controls

Movement of the M-line, during 2D Doppler or 2D Color Doppler, while in the 2D acquisition mode can cause a momentary radial line artifact to appear in the 2D image.

PAL video systems only: During VCR playback, the DOPPLER GAIN rotary control does NOT adjust the tint of the color VCR playback display.

2D

ECG and heart rate graphics are displayed on recalled images to which they have no relation. The graphics do not relate to the recalled images and should not be used in connection with the recalled images for any purpose.

The scanhead orientation marker disappears during 2D save-recall. The scanhead orientation marker will reappear after leaving 2D save-recall and changing the image display using the 2D controls.

The gray bar on the black-and-white monitor disappears during 2D save-recall. To recover the gray bar, a mode change is required.

If a “white line” artifact appears at the bottom of the L7–4 linear display, then increase the frame rate or line density to their maximum values to eliminate it.

Some systems no longer support the 4-on-1 save-recall image format.

Using dual Cineloop® review to acquire short Cineloop sequences may result in a mix of image sequences in the Cineloop memory buffer. A mix of image sequences, possibly scaled differently or acquired at different depths, could result in erroneous measurements. During dual Cineloop review, an image sequence that exhibits a broken or abnormal appearance indicates this phenomenon. Do not use images from Cineloop sequences that contain images that exhibit this quality. If you experience the phenomenon described here with dual Cineloop review, increase the length of the Cineloop sequences

that you acquire. Increasing the length of the Cineloop sequence will ensure that the data in the Cineloop memory buffer is consistent and properly scaled.

Doppler

In simultaneous mode, 2D and spectral Doppler, a buzz can be heard in the Doppler audio.

In simultaneous mode, 2D and spectral Doppler, with PRF set at 8333 Hz and the Wall Filter set to 50 Hz, bright spikes appear at the zero baseline. To eliminate the bright spikes at the zero baseline, reduce the PRF or change the Wall Filter setting.

In simultaneous mode, 2D and spectral Doppler, with a P3.5 28mm, PRF set at 3704 Hz or lower, and the 2D Depth at 7.8 cm, bright spikes appear at the zero baseline. To eliminate the bright spikes at the zero baseline, change the PRF.

In steered CW Doppler, the CW line may not always go to the edge of the sector when the TRACKBALL is moved quickly and in the direction of the scanhead orientation marker.

If the Doppler display is unfrozen while in Doppler review, the High Q t Automatic Doppler Analysis peak and mean traces will be erased. To display the peak and mean traces, press FRZ and move the TRACKBALL.

Color

When Color M-mode is active, and at a high sweep speed, the color portion of the display may not scroll as smoothly as the gray scale portion. To correct this situation, select a slower sweep speed.

The color bar annotation can be erased during Color M-mode analysis. To recover from this situation, press FRZ twice.

Random flashes of erroneous color data can occur while adjusting the color overlay position. The flashes will stop after the color overlay position has been adjusted.

In 2D Color at maximum sector depth, with a color PRF below 1500 Hz, a ribbon of color may appear at the bottom of the color overlay. Reduce the height of the color overlay size to increase the color PRF and eliminate this artifact.

During scrolling in Color M-mode at a depth of 13.7 cm, a band of color radial lines will appear on the display.

Selecting a different scanhead during 2D Color Doppler acquisition, and then selecting 2D only mode will result in a 2D image with multiple focal zones. Do not select a different scanhead from 2D Color Doppler. Before selecting a different scanhead, select 2D only mode, and then select a scanhead.

During non-scrolling simultaneous 2D Color Doppler, color spikes are visible at varying depths. To eliminate the color spikes, press DOP to start scrolling, or select 2DRES, using *HighFR/High Res*.

Using either the C7–4 or the C5 40R scanhead, at a maximum 2D depth of 13.7 cm, scrolling Color M-mode will result in a band of inaccurate color data about .5 cm in width at the bottom of the Color M-mode display.

Transducer Select

Selecting the L10–5 during 2D only mode results in a smaller 2D gain value than selecting the L10–5 from 2D color Doppler mode. Adjust 2D GAIN as required.

Setup

In 2D save-recall, the heart rate that is displayed is not related to the save-recall image; the displayed heart rate is the current heart rate. Additionally, recalling a 2D color image erases the HEART RATE annotation, leaving only the heart rate value. A system mode change will correct both heart rate discrepancies.

In split screen Doppler, with the 2D image inverted, the graphics on the color video monitor can be hard to read. To correct this situation, use a normal 2D image or turn off the split screen display.

PAL video systems, English only: To set the date always enter month, day, and year. When you enter the date, verify that the correct date is displayed on the video monitor.

OB, GYN and Fertility Analysis

Any age or estimated date of delivery (EDD) determined by last menstrual period (LMP) occurring in a leap year (1992, 1996,...) may be inaccurate by a day.

VCR

With an external VCR and an external color printer, color prints of some recorded displays from VCR record-pause result in loss of sync, which causes scrambled graphics. If this situation occurs, to eliminate the scrambled graphics, initiate the print from VCR playback–pause.

A “Please Stand By: Tape Search In Progress” message can remain on the screen, although the end of the tape has been reached. To clear the message, change the operating mode.

If *Position Tape* on the *PATIENT DIRECTORY* panel fails to position the tape at the correct patient exam, try the *Position Tape* selection again.

To ensure VCR patient directory integrity, do not eject a patient directory videotape cassette while displaying a 2D save-recall image.

Transcranial Doppler

Changing the sample volume depth during transcranial Doppler acquisition, and then using Doppler review can result in display annotation that does not match the spectral review data. Ensure that the Doppler review display annotation matches the spectral review data: if possible, do not change the sample volume depth while acquiring the Doppler review data, but if it is necessary, then ensure that you understand the consequences of this change and are aware of the effects upon the display.

OPERATING NOTES

Build Version: v21802D and E **Rev A February 1, 1995**

These notes are informational; they are included here to clarify certain system responses that might cause operator misunderstanding or difficulty.

Movement of the M-line, during 2D Doppler or 2D Color Doppler, while in the 2D acquisition mode can cause a momentary radial line artifact to appear in the 2D image.

PAL video systems only: During VCR playback, the DOPPLER GAIN rotary control does NOT adjust the tint of the color VCR playback display.

2D

ECG and heart rate graphics are displayed on recalled images to which they have no relation. The graphics do not relate to the recalled images and should not be used in connection with the recalled images for any purpose.

The scanhead orientation marker disappears during 2D save-recall. The scanhead orientation marker will reappear after leaving 2D save-recall and changing the image display using the 2D controls.

The gray bar on the black-and-white monitor disappears during 2D save-recall. To recover the gray bar, a mode change is required.

If a “white line” artifact appears at the bottom of the L7–4 linear display, then increase the frame rate or line density to their maximum values to eliminate it.

Some systems no longer support the 4-on-1 save-recall image format.

Using dual Cineloop® review to acquire short Cineloop sequences may result in a mix of image sequences in the Cineloop memory buffer. A mix of image sequences, possibly scaled differently or acquired at different depths, could result in erroneous measurements. During dual Cineloop review, an image sequence that exhibits a broken or abnormal appearance indicates this phenomenon. Do not use images from Cineloop sequences that contain images that exhibit this quality. If you experience the phenomenon described here with dual Cineloop review, increase the length of the Cineloop sequences that you acquire. Increasing the length of the Cineloop sequence will ensure that the data in the Cine-loop memory buffer is consistent and properly scaled.

Doppler

In simultaneous mode, 2D and spectral Doppler, a buzz can be heard in the Doppler audio.

In simultaneous mode, 2D and spectral Doppler, with PRF set at 8333 Hz and the Wall Filter set to 50 Hz, bright spikes appear at the zero baseline. To eliminate the bright spikes at the zero baseline, reduce the PRF or change the Wall Filter setting.

In simultaneous mode, 2D and spectral Doppler, with a P3.5 28mm, PRF set at 3704 Hz or lower, and the 2D Depth at 7.8 cm, bright spikes appear at the zero baseline. To eliminate the bright spikes at the zero baseline, change the PRF.

In steered CW Doppler, the CW line may not always go to the edge of the sector when the TRACK-BALL is moved quickly and in the direction of the scanhead orientation marker.

If the Doppler display is unfrozen while in Doppler review, the High Q t Automatic Doppler Analysis peak and mean traces will be erased. To display the peak and mean traces, press FRZ and move the TRACKBALL.

Color

When Color M-mode is active, and at a high sweep speed, the Color portion of the display may not scroll as smoothly as the gray scale portion. To correct this situation, select a slower sweep speed.

The color bar annotation can be erased during Color M-mode analysis. To recover from this situation, press FRZ twice.

Random flashes of erroneous Color data can occur while adjusting the Color overlay position. The flashes will stop after the Color overlay position has been adjusted.

In 2D Color at maximum sector depth, with a Color PRF below 1500 Hz, a ribbon of color may appear at the bottom of the Color overlay. Reduce the height of the Color overlay size to increase the Color PRF and eliminate this artifact.

During scrolling in Color M-mode at a depth of 13.7 cm, a band of color radial lines will appear on the display.

Selecting a different scanhead during 2D Color Doppler acquisition, and then selecting 2D only mode will result in a 2D image with multiple focal zones. Do not select a different scanhead from 2D Color Doppler. Before selecting a different scanhead, select 2D only mode, and then select a scanhead.

During non-scrolling simultaneous 2D Color Doppler, color spikes are visible at varying depths. To eliminate the color spikes, press DOP to start scrolling, or select 2DRES, using *HighFR/High Res*.

Using either the C7–4 or the C5 40R scanhead, at a maximum 2D depth of 13.7 cm, scrolling Color M-mode will result in a band of inaccurate color data about .5 cm in width at the bottom of the Color M-mode display.

Transducer Select

Selecting the L10–5 during 2D only mode results in a smaller 2D gain value than selecting the L10–5 from 2D Color Doppler mode. Adjust 2D GAIN as required.

Setup

In 2D save-recall, the heart rate that is displayed is not related to the save-recall image; the displayed heart rate is the current heart rate. Additionally, recalling a 2D color image erases the HEART RATE annotation, leaving only the heart rate value. A system mode change will correct both heart rate discrepancies.

In split screen Doppler, with the 2D image inverted, the graphics on the color video monitor can be hard to read. To correct this situation, use a normal 2D image or turn off the split screen display.

PAL video systems, English only: To set the date always enter month, day, and year. When you enter the date, verify that the correct date is displayed on the video monitor.

OB, GYN and Fertility Analysis

Any age or estimated date of delivery (EDD) determined by last menstrual period (LMP) occurring in a leap year (1992, 1996,...) may be inaccurate by a day.

VCR

With an external VCR and an external color printer, color prints of some recorded displays from VCR record-pause result in loss of sync, which causes scrambled graphics. If this situation occurs, to eliminate the scrambled graphics, initiate the print from VCR playback–pause.

A “Please Stand By: Tape Search In Progress” message can remain on the screen, although the end of the tape has been reached. To clear the message, change the operating mode.

If *Position Tape* on the *PATIENT DIRECTORY* panel fails to position the tape at the correct patient exam, try the *Position Tape* selection again.

Transcranial Doppler

Changing the sample volume depth during transcranial Doppler acquisition, and then using Doppler review can result in display annotation that does not match the spectral review data. Ensure that the Doppler review display annotation matches the spectral review data: if possible, do not change the sample volume depth while acquiring the Doppler review data, but if it is necessary, then ensure that you understand the consequences of this change and are aware of the effects upon the display.

OPERATING NOTES

Build Version: v21904E **Rev A January 26, 1996**

These notes are informational; they are included here to clarify certain system responses that might cause operator misunderstanding or difficulty.

System Controls

Movement of the M-line, during 2D Doppler or 2D Color Doppler, while in the 2D acquisition mode can cause a momentary radial line artifact to appear in the 2D image.

PAL video systems only: During VCR playback, the DOPPLER GAIN rotary control does NOT adjust the tint of the color VCR playback display.

2D

ECG and heart rate graphics are displayed on recalled images to which they have no relation. The graphics do not relate to the recalled images and should not be used in connection with the recalled images for any purpose.

The scanhead orientation marker disappears during 2D save-recall. The scanhead orientation marker will reappear after leaving 2D save-recall and changing the image display using the 2D controls.

The gray bar on the black-and-white monitor disappears during 2D save-recall. To recover the gray bar, a mode change is required.

If a “white line” artifact appears at the bottom of the L7–4 linear display, then increase the frame rate or line density to their maximum values to eliminate it.

Some systems no longer support the 4-on-1 save-recall image format.

Using dual Cineloop® review to acquire short Cineloop sequences may result in a mix of image sequences in the Cineloop memory buffer. A mix of image sequences, possibly scaled differently or acquired at different depths, could result in erroneous measurements. During dual Cineloop review, an image sequence that exhibits a broken or abnormal appearance indicates this phenomenon. Do not use images from Cineloop sequences that contain images that exhibit this quality. If you experience the phenomenon described here with dual Cineloop review, increase the length of the Cineloop sequences

that you acquire. Increasing the length of the Cineloop sequence will ensure that the data in the Cineloop memory buffer is consistent and properly scaled.

If you select a P3–2 scanhead after a P5–3 scanhead, then the P3–2 scanhead will initialize with a frame rate of 21 Hz. Use *2D Frame Rate* on the *2D CONTROLS* panel to obtain the desired frame rate.

Doppler

In simultaneous mode, 2D and spectral Doppler, a buzz can be heard in the Doppler audio.

In simultaneous mode, 2D and spectral Doppler, with PRF set at 8333 Hz and the Wall Filter set to 50 Hz, bright spikes appear at the zero baseline. To eliminate the bright spikes at the zero baseline, reduce the PRF or change the Wall Filter setting.

In simultaneous mode, 2D and spectral Doppler, with a P3.5 28mm, PRF set at 3704 Hz or lower, and the 2D Depth at 7.8 cm, bright spikes appear at the zero baseline. To eliminate the bright spikes at the zero baseline, change the PRF.

In steered CW Doppler, the CW line may not always go to the edge of the sector when the TRACKBALL is moved quickly and in the direction of the scanhead orientation marker.

If the Doppler display is unfrozen while in Doppler review, the High Q t Automatic Doppler Analysis peak and mean traces will be erased. To display the peak and mean traces, press FRZ and move the TRACKBALL.

Color

When Color M-mode is active, and at a high sweep speed, the Color portion of the display may not scroll as smoothly as the gray scale portion. To correct this situation, select a slower sweep speed.

The color bar annotation can be erased during Color M-mode analysis. To recover from this situation, press FRZ twice.

Random flashes of erroneous Color data can occur while adjusting the Color overlay position. The flashes will stop after the Color overlay position has been adjusted.

In 2D Color at maximum sector depth, with a Color PRF below 1500 Hz, a ribbon of color may appear at the bottom of the Color overlay. Reduce the height of the Color overlay size to increase the Color PRF and eliminate this artifact.

During scrolling in Color M-mode at a depth of 13.7 cm, a band of color radial lines will appear on the display.

Selecting a different scanhead during 2D Color Doppler acquisition, and then selecting 2D only mode will result in a 2D image with multiple focal zones. Do not select a different scanhead from 2D Color Doppler. Before selecting a different scanhead, select 2D only mode, and then select a scanhead.

During non-scrolling simultaneous 2D Color Doppler, color spikes are visible at varying depths. To eliminate the color spikes, press DOP to start scrolling, or select 2DRES, using *HighFR/High Res*.

Using either the C7–4 or the C5 40R scanhead, at a maximum 2D depth of 13.7 cm, scrolling Color M-mode will result in a band of inaccurate color data about .5 cm in width at the bottom of the Color M-mode display.

Transducer Select

Selecting the L10–5 during 2D only mode results in a smaller 2D gain value than selecting the L10–5 from 2D Color Doppler mode. Adjust 2D GAIN as required.

Setup

In 2D save-recall, the heart rate that is displayed is not related to the save-recall image; the displayed heart rate is the current heart rate. Additionally, recalling a 2D color image erases the HEART RATE

annotation, leaving only the heart rate value. A system mode change will correct both heart rate discrepancies.

In split screen Doppler, with the 2D image inverted, the graphics on the color video monitor can be hard to read. To correct this situation, use a normal 2D image or turn off the split screen display.

PAL video systems, English only: To set the date always enter month, day, and year. When you enter the date, verify that the correct date is displayed on the video monitor.

Cardiac Doppler Analysis

When performing valve gradient studies, ensure that your trace includes start of flow, peak velocity, and end of flow. An erroneous peak pressure gradient calculation will result if the trace is incomplete or the peak velocities are not correctly identified by arrows. During the trace operation, the first two peak velocities are automatically marked with arrows. The first peak velocity found is used as the maximum velocity in Aortic and Pulmonic Valve studies, and the first peak velocity is used as the E peak velocity in the Mitral and Tricuspid Valve studies. The second peak velocity is not used in the the Aortic and Pulmonic Valve studies, but it is used as the A peak velocity in the Mitral and the Tricuspid Valve studies.

OB, GYN and Fertility Analysis

Any age or estimated date of delivery (EDD) determined by last menstrual period (LMP) occurring in a leap year (1992, 1996,...) may be inaccurate by a day.

VCR

With an external VCR and an external color printer, color prints of some recorded displays from VCR record-pause result in loss of sync, which causes scrambled graphics. If this situation occurs, to eliminate the scrambled graphics, initiate the print from VCR playback–pause.

A “Please Stand By: Tape Search In Progress” message can remain on the screen, although the end of the tape has been reached. To clear the message, change the operating mode.

If *Position Tape* on the *PATIENT DIRECTORY* panel fails to position the tape at the correct patient exam, try the *Position Tape* selection again.

Transcranial Doppler

Changing the sample volume depth during transcranial Doppler acquisition, and then using Doppler review can result in display annotation that does not match the spectral review data. Ensure that the Doppler review display annotation matches the spectral review data: if possible, do not change the

sample volume depth while acquiring the Doppler review data, but if it is necessary, then ensure that you understand the consequences of this change and are aware of the effects upon the display.

7 Service Bulletins

See following pages

WITH ATTACHMENTS: YES j NO J
WITH PARTS: YES j NO J

Service Bulletin

Date:	June 24, 1991	S.B. No.:	HDI–02	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:	Robert Olver			

Scanhead Select Module Installation/Removal

PROBLEM: There have been several instances where the Scanhead Select Modules, Channel Boards, and/or the Card Cage have been damaged either by over tightening the retaining screws or by tightening the screws unevenly.

SOLUTION: It is imperative that the screws on the Scanhead Select Module be tightened in the proper sequence to prevent damage to the Scanhead Select Module and/or the Channel Boards.

PROCEDURE:

1. Being careful of the alignment between the Scanhead Select PCB and the Scanhead Select Daughterboard connection, place the Scanhead Select PCB on the system.
2. Verify that the Scanhead Select PCB is flush against the card cage **evenly** on all sides.
3. Referring to the attached tightening sequence diagram (Figure 1), hand tighten the retaining screws.
4. Again, using the tightening sequence, tighten each screw, using the proper tool, no more than one turn at a time until snug.

CAUTION: *Do not over tighten the screws or damage to the Scanhead Select PCB, Channel Boards, Scanhead Select Daughterboard, or Card Cage may result.*

5. Turn on the system and verify proper system image quality, looking particularly for channel dropout or noise which could be caused by improper seating of the Scanhead Select Module.

REMOVAL PROCEDURE:

1. When removing the Scanhead Select Module, loosen the retaining screws in the numeric sequence indicated in Figure 1 **(loosen no more than one turn at a time)**.

2. After loosening all the screws, ensure that the Scanhead Select Module is pulled **straight out** to prevent damage to the Channel Board connectors or the Scanhead Select Daughterboard connector.

ADDITIONAL INFO: The retaining screws on the latest release of the Scanhead Select Module, part number 7500-0629-04, have been changed to a 7/64” Allen fastener. This version of the Scanhead Select PCB began shipment on 1 June 1991. A 7/64” allen driver is contained in the Hex/Allen driver set, part number 199-19014-01, which should be part of the CSR tool kit.

This figure is electronically unavailable.

Figure 1. Scanhead Select Module Screw Tightening/Loosening Sequence

WITH ATTACHMENTS: YES j NO J
WITH PARTS: YES j NO J

Service Bulletin

Date:	July 18, 1991	S.B. No.:	HDI–03	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:	Rober Olver			

L10-5 Scanhead Problems

PROBLEM 1: If the UM-9 HDI system is booted with an L10-5 scanhead, using the OFE Tests may indicate excessive channel to channel gain variances and/or wide variances in gain at different depths. This could give false indications of faulty Channel Boards, Scanhead Select Modules, or scanheads.

EFFECTIVITY: Software -- All HDI software builds
Scanhead -- L10-5

SOLUTION 1: Always calibrate or boot the system with any scanhead other than the L10-5 when intending to use the OFE Tests.

This problem will be corrected in a future software build.

PROBLEM 2: The L10-5 scanhead may be susceptible to damage caused by the extreme low temperatures that may be encountered during shipping. Scanhead elements may crack if the temperature is near the --20_ C lower limit of the L10-5s storage temperature range.

EFFECTIVITY: Scanhead -- All L10-5 scanheads

SOLUTION 2: When installing any L10-5 scanhead, verify that all elements are functional using the OFE Tests (channel tests) found in Section 4 of the UM-9 HDI Service Manual.

If any elements are not functioning, replace the scanhead.

WITH ATTACHMENTS: YES j NO J
WITH PARTS: YES j NO J

Service Bulletin

Date:	August 21, 1991	S.B. No.:	HDI–05	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:	Robert Olver			

UM-9 HDI System Issues

INTRO: This service bulletin outlines some known issues currently being experienced on a few field HDI systems. Additional system operational issues are outlined in the UM-9 HDI Operating Notes part number 4707-0013-01 and -02. A copy of these operating notes is contained in the UM-9 HDI Service Manual.

Although the solutions listed below will correct their respective problem as stated, it should be noted that most of these issues can also be caused by other system failures. The information in this service bulletin should only be used in

conjunction with standard troubleshooting practices including minimum configuration, error log, etc.

The information provided in this service bulletin is highly confidential and should not be divulged to anyone other than ATL personnel.

<u>ISSUE 1:</u> System indicates a "Power Monitor Fault" with the L10-5 Scanhead. This may also occur on other scanheads but has been primarily associated with the L10-5.

EFFECTIVITY: All UM-9 HDI systems at 8.35 or lower software.

WORK AROUNDS: Minimize power output levels by reducing power output, minimizing depth, minimizing sector width, reducing PRF, etc. Re-calibrating the scanhead will usually restore normal operation after the Power Monitor Fault has occurred.

CAUSE: Software issue.

SOLUTION: A future upgrade program will be conducted to baseline all UM-9 HDI systems with a software version that corrects this problem.

OTHER This same problems can be caused by hardware failures in the Channel Boards, Scanhead Select Module, Front End Controller, and the Pulser Power

Supply. However, if the problem is caused by a hardware fault, the work arounds described above will probably not prevent the problems.

<u>ISSUE 2</u>: Color Box fills up with color during Color 2D operation.

EFFECTIVITY: All UM-9 HDI systems with a -04 CDP PCB at all software builds.

WORK AROUNDS: Freezing and then unfreezing the system or changing imaging modes will temporarily correct this problem.

CAUSE: Timing problems on the -04 CDP PCB.

SOLUTION: This problem is not exhibited on all -04 CDP boards, therefore, replacing a -04 with another may solve the problem. This problem will be corrected on a future revision of the CDP PCB.

OTHER A problem very similar to this one can be caused by improperly seated or faulty scan converter jumper cables or by faulty scan converter boards.

<u>ISSUE 3</u>: TGC, Color Box, Focal Zone Marker and other system graphics are slow to update after a control change.

EFFECTIVITY: All UM-9 HDI systems at all current software builds.

WORK AROUNDS: None identified.

CAUSE: Under investigation. Probable AVP timing issues.

SOLUTION: A future upgrade program will be conducted to baseline all UM-9 HDI systems with a software version that corrects this problem.

<u>ISSUE 4</u>: A "clicking" noise is heard in the microphone audio in VCR playback.

EFFECTIVITY: All UM-9 HDI systems with internal VCR.

WORK AROUNDS: None identified.

CAUSE: Crosstalk on AVP PCB.

SOLUTION: Will be corrected in a future revision to the AVP PCB.

<u>ISSUE 5</u>: Noise and/or grainy 2D images or vertical Channel "drop-out" is visible in imaging or in the OFE Tests.

EFFECTIVITY: All UM-9 HDI systems.

WORK AROUNDS: None identified.

CAUSE: Partially unseated Scanhead Select Module or Channel Boards. May also be caused by oxidation on the Channel Board front edge connectors.

SOLUTION: Reseat Scanhead Select Module and Channel Boards. Clean the front edge connectors on the channel boards using freon or alcohol. Refer to Service Bulletin HDI--02 for proper procedures for tightening the Scanhead Select Module.

OTHER Similar problems can be caused by hard failures of scanhead elements, Channel Boards, Scanhead Select Module, and the Scanhead Select Daughterboard.

ISSUE 6: Loss of spectral Doppler. System intermittently does not boot. “Break-up” in the spectral Doppler.

EFFECTIVITY: All UM-9 HDI systems with -06, -07, -08 ADDA PCBs.

WORK AROUNDS: None identified.

CAUSE: Timing problems resulting in the ADDA board not initializing or not initializing properly.

SOLUTION: Corrected on the new ADDA board (-09). A future upgrade program will be conducted to baseline all UM-9 HDI systems with the new ADDA to correct this problem.

<u>ISSUE 7</u>: Cooling fans stop operating, causing “Overtemp Messages” and/or erratic system operation. Can also result in system hardware failures.

EFFECTIVITY: All UM-9 HDI systems shipped prior to June 1, 1991.

WORK AROUNDS: None identified.

CAUSE: Intermittent opens in the 3500-1173-02 cable in the fan module or failure of the Fan Controller PCB.

SOLUTION: Refer to Service Bulletin HDI- -01 for detailed information on troubleshooting and correcting this problem.

<u>ISSUE 8</u>: A “humming” sound is heard in the VCR playback audio on International PAL AG-7330 SVHS VCRs.

EFFECTIVITY: PAL systems with the 7330 SVHS VCR and Data Ray Color Video Monitors.

WORK AROUNDS: Placing the “Audio Out Select” switch in the “Hi-Fi/Auto” position and the “Hi-Fi Rec” switch in the “On” position will eliminate this problem. However,

changing this switch position will disable the Audio Dub capability and is not recommended unless the customer will never use the Audio Dub function. Replacing the Data Ray video monitor with the Sony Color Monitor may also take care of this issue.

CAUSE: Electro-magnetic interference (EMI) from the Data Ray Color Video monitor.

SOLUTION: No engineering changes have been identified to correct this problem.

WITH ATTACHMENTS: YES j NO J
WITH PARTS: YES j NO J

Service Bulletin

Date:	November 26, 1991	S.B. No.:	HDI–06	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:	Angie Vergel			

UM-9 HDI Scanhead “No Boot” Problems

PROBLEM: Scanhead “no boot” failures.

POSSIBLE CAUSES:

- Faulty Scanhead Select Daughterboard PCB, P/N 7500-0636-XX.
- Intermittent connection or damage to ribbon cable assembly, 3500-1323-01, from the Front End Controller (FEC) PCB to the Scanhead Select Daughterboard.

1. The ribbon cable is being stressed or damaged by the weight of the ferrite sleeve causing intermittent contact with the FEC PCB.

2. The ribbon cable is being pinched by the PCB cover and/or the cover mounting hardware.

RECOMMENDATION: Perform the OFE Self Test. An error code of 40000000 indicates a faulty Scanhead Select Daughterboard PCB or cable assembly. Verify the cable. Perform continuity tests. Replace the cable if damaged or intermittent.
If the cable is intact, carefully slide the ferrite sleeve close to the connector and secure it to the FEC connector on the FEC PCB using a tie-wrap (see Figure 1). The kapton tape, wrapped around the sleeve, should not need to be removed or replaced. If the tape needs to be removed, do so carefully and reuse the tape to insulate the sleeve.

Securing the sleeve to the FEC PCB connector will help keep the weight of the ferrite sleeve from pulling on the connector and stressing the cable. The tie-wrap should also eliminate problems associated with vibration.

Verify proper cable routing. Ensure that the cable clears the screw holes on the card cage.

Verify that there is a 3.5” area on the upper and lower lip of the PCB cover (P/N 1065-1582-02) that **is not** covered with the shield strip (see Figure 1). Current covers should not have the shield strip.

NOTE: Engineering is currently making mechanical changes to the cable and PCB cover. The effectivity of these changes is mid-November. In the interim, verify the above.

Ribbon cable (ferrite sleeves/clips installed)	3500-1323-01	
Ribbon cable (without ferrite sleeve)	3500-1226-02	
Ferrite Sleeve	2604-0042-01	Qty. 2
Ferrite Clips	1563-0187	Qty. 2
Tie-wrap 11.5” (shorter tie-wraps, found in CSR tool kits, can be used if connected end-to-end)	2208-0061	

WITH ATTACHMENTS: YES j NO J
WITH PARTS: YES j NO J

Service Bulletin

Date: November 26, 1991
To: All Field Service Personnel
Author: Jerry Norimatsu

S.B. No.: HDI–07 Rev:
E.C.N. No.:

Poor Contact Between Scanhead Select PCB and Channel Board PCBs

EFFECTIVITY: HDI system shipped prior to October 1, 1991.

SOLUTION: Order the following Field Mod. Kit and replace the gaskets on the Channel Board PCBs.

Part Number	Description
6220-0114-01	UM-9 HDI Channel Board PCB Convertibility Kit

Poor contact can cause the following problems:

1. Poor image quality-channel dropouts in the image
2. “Scanhead Power Monitor Failure”

Notes

1. Do not open a service call to install this kit without TAC approval.
2. Do not install this kit on the next call basis.
3. Install this kit only when opening or troubleshooting the DBF front end.

WITH ATTACHMENTS: YES j NO J
WITH PARTS: YES j NO J

Service Bulletin

Date:	November 26, 1991	S.B. No.:	HDI–08	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:	James Baird			

External Video Recorder Audio Hook-up

PROBLEM: Some customers prefer to have an external video cassette recorder in addition to their internal VCR, for either back-up or to support another video format, such as 3/4” commercial Sony Beta. The UM-9 provides access for the video signals, however the capacity for audio transfer and dubbing is not available on the rear panel.

EFFECTIVITY: All UM-9 and UM-9 HDI.

CAUSE: Systems built without the external video recorder option (mutually exclusive to internal VCR) do not have the rear panel mounted audio connectors.

SOLUTION: A simple fix that will allow the user to record audio to an external device consists of the insertion of wye leads in the audio path.

This fix will only allow audio playback via the internal VCR, as the audio cannot be switched for playback. This setup does however allow simultaneous backup and format conversion via external VCR.

NOTE: *Purchase the parts required, keep the receipt, and submit it with an FSR that the customer has signed so they can be billed.*

Parts Required (available at Radio Shack)

Description	Qty	Tandy P/N
Bulkhead mountable Female RCA Phono Jacks	2	274-346 or 274-852
Two Female to One Male RCA Phono WYE Connector	2	274-303
Male RCA Phono to tinned ends Cable	2	42-2371 or 42-2372

Installation

1. Remove the two cables attached to the internal VCR RCA phono jacks labeled AUDIO IN (noting which connector connects to CH1 and CH2).

2. Connect CH1 to one of the female connectors of a wye connector.

3. Connect the male end to the respective connector on the VCR.

4. Connect the audio patch cord to the remaining wye connector.

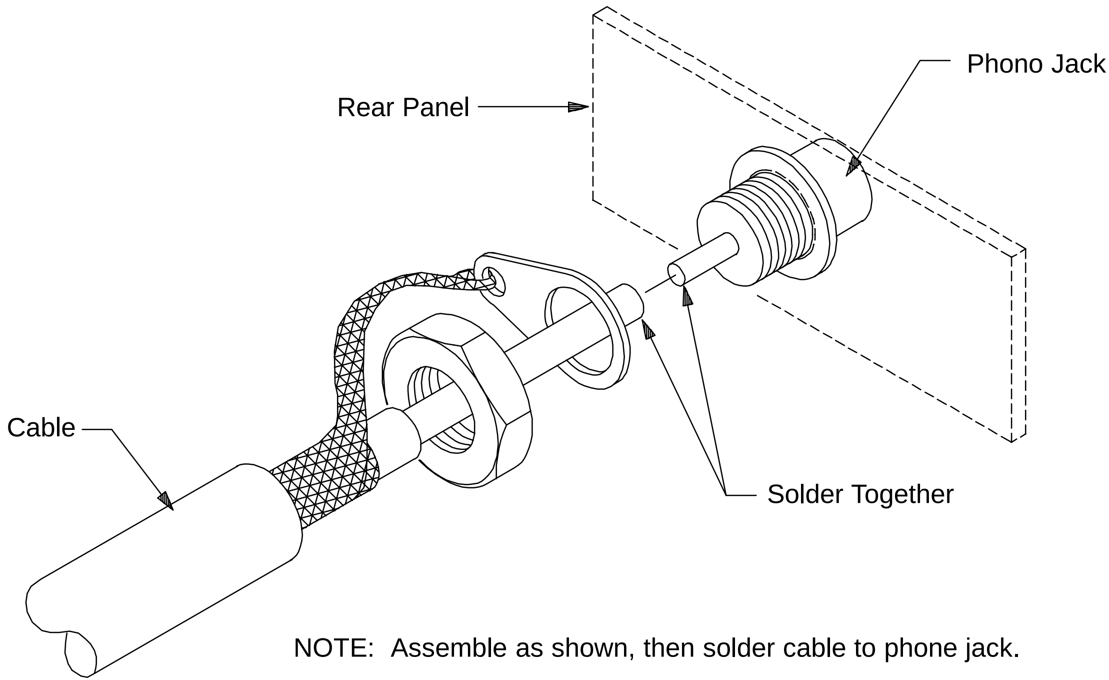
5. Run cable through the slot behind the fire screen to allow the cable to meet its connector location on rear panel. Cut cable to size allowing for internal cameras, etc.

6. Solder the end of the patch cord to the bulkhead mounted RCA female connector to be mounted on the rear panel by removing the J1 and J3 (the top pair) knock-out covers on the rear panel.

7. Repeat steps 2 - - 6 for CH 2.

8. Ensure that the external color page printer and internal/external VCR are configured on as applicable. The internal VCR and external VCR configurations are mutually exclusive. The external page printer allows playback viewing (via the ext. OEM button) through the system monitor in systems with an internal VCR.

9. Perform a test to verify satisfactory operation of both recorders.



NOTE: Assemble as shown, then solder cable to phone jack.

MISC/SVC-BULL/HDI-08/AUDIOHUP 12-03-91

WITH ATTACHMENTS: YES ☐ NO ☐
WITH PARTS: YES ☐ NO ☐

Service Bulletin

Date:	December 27, 1991	S.B. No.:	HDI–09	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:	Stan Trussell			

UM-9 HDI Channel PCB Card Ejectors

PROBLEM: Damage is occurring to channel PCB part number 7500-0544-XX upon removal from the card cage. This has resulted in some PCBs being scrapped.

CAUSE: Using tools other than ATL card ejectors, needle nose pliers, screwdrivers, etc.

SOLUTION: All HDI systems are issued one (1) card ejector, ATL P/N 1065-1462-04 (plastic version). It is advisable to use two (2) ejectors when removing PCBs from the card cage. Also available is P/N 6016-0084-01 (metal version used on UM-6/7 systems).

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	January 14, 1992	S.B. No.:	HDI–10	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:	Todd Chapman/Keith Danhert			

UM-9 HDI 5V and Ground Bus Bar Connection to the Motherboard

Over-torque or cross-twist on nuts holding bus bar to power supply or motherboard.

CAUSE: Swivels and extensions used for ease of access also can multiply torque.

SOLUTION: If power supply connections need to be checked, loosen the connection before tightening. Do not use excessive torque when tightening the nuts. Use of a swivel and/or extenders may amplify the amount of torque applied by a factor of three. If the bolts on the motherboard are broken, the motherboard must be replaced.

WITH ATTACHMENTS: YES ■ NO □
WITH PARTS: YES □ NO ■

Service Bulletin

Date:	March 23, 1992	S.B. No.:	HDI–11	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:				

UM-9 HDI Color Necklace Problem (Software Level 8.36)

PROBLEM: Randomly-flashing color spots appear along the first or uppermost row of the color sector. Spots may appear along the entire length of the row at one time, or flash a few at a time in random locations. This condition occurs for all scan-head types, independent of the selected user setup package (RAD, CARD, etc)., and at various combined settings of depth, color sensitivity, velocity range, color window size, and color window location. Symptoms are most obvious when viewed against the color sector test pattern with maximum color window size selected. See attached prints.

EFFECTIVITY: Software level 8.36

PROCEDURE:

1. Turn PERSISTENCE off. If the problem goes away, replace the Advanced Digital Data Analyzer with current recommended PCB 7500-0603-09 for 8.36 software.

2. If the problem exists with PERSISTENCE off, there is a timing issue with some of the system modules and it is a known UM-9 HDI system discrepancy. Do not replace parts to fix the problem.

The color photo attachment for this service bulletin is electronically unavailable.
Please see the hard copy.

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	March 30, 1992	S.B. No.:	HDI–12	Rev:	
To:	All Field Service Personnel	E.C.N. No.:			
Author:	Darrell Jacoway				

P1 Connector on Scanhead Select PCB (UM-9 HDI)

PROBLEM: The right side cover may not fit on UM-9 HDI systems with Scanhead Select PCBs P/N 7500-0629-03 and lower dash levels.

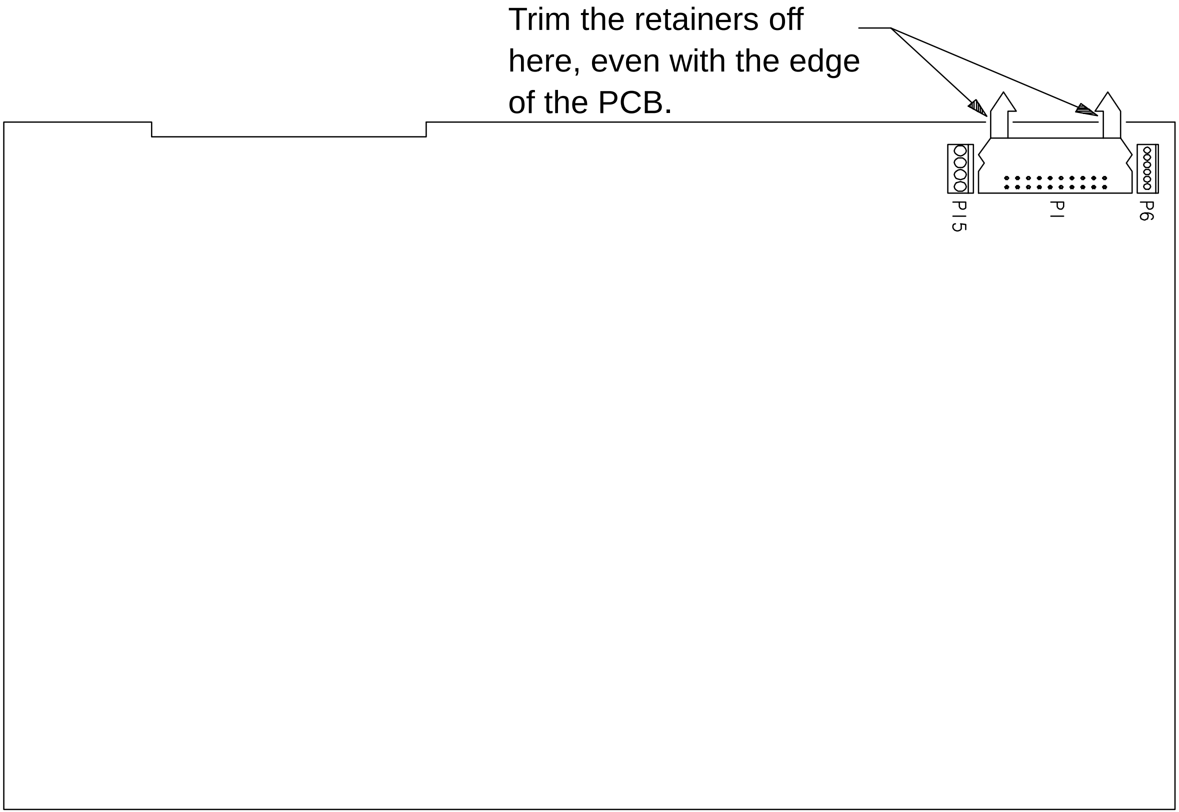
CAUSE: The P1 connector retainers extend beyond the right side of the Scanhead Select PCB.

NOTE: *This problem may not be seen until upgrading the system to Wide Aperture Annular Array capability, Upgrade P/N 8055-0744-01. At that time the ribbon cable will be plugged into P1 causing the over-extended retainers.*

The upgrade instructions will describe in detail how to shorten the retainers.

SOLUTION: If this problem occurs, do not force-fit the side cover onto the system.

Cut off the top and bottom retainers of P1 (the WAAM signal interface connector) on the Scanhead Select PCB using a pair of diagonal cutters. See Figure 1.



MISC/SVC-BULL/LINEART/SCSELPCB 03-31-92

Figure 1. Scanhead Select PCB

WITH ATTACHMENTS: YES ☐ NO ☐
WITH PARTS: YES ☐ NO ☐

Service Bulletin

Date:	May 27, 1992	S.B. No.:	HDI–13	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:	David Kohler			

Re-routing Hard Drive Cable to Clear Camera Intake Fan

PROBLEM The Matrix Camera internal temperature may exceed the maximum recommended temperature of 40 degrees C. This could result in an unusually high failure rate of cameras.

CAUSE: The hard drive ribbon cable is blocking the fan exhaust path.

EFFECTIVITY All UM-9 HDI systems with matrix cameras installed which were shipped before March 2, 1992. The following procedure is to be performed on a next call basis.

SOLUTION: Re-route the hard drive ribbon cable (see Figure 1).

1. Remove the cable from the hard drive.
2. Remove the hard drive mounting bracket (4 screws).
3. Put two 90 degree bends in the cable as shown (Figure 1).
4. Route the cable underneath the mounting bracket and reconnect it to the hard drive. (Do not route the cable directly under the hard drive.)
5. Carefully install the hard drive mounting bracket with the two 90 degree bends underneath—the cable should come out from underneath the bracket just past the edge of the fan.

NOTE: *If you feel that the ribbon cable may be pinched as it exits the bracket at the rear, install washers under the bracket to raise it sufficiently to allow clearance.*

6. Tie wrap cables as needed and install rear cover.

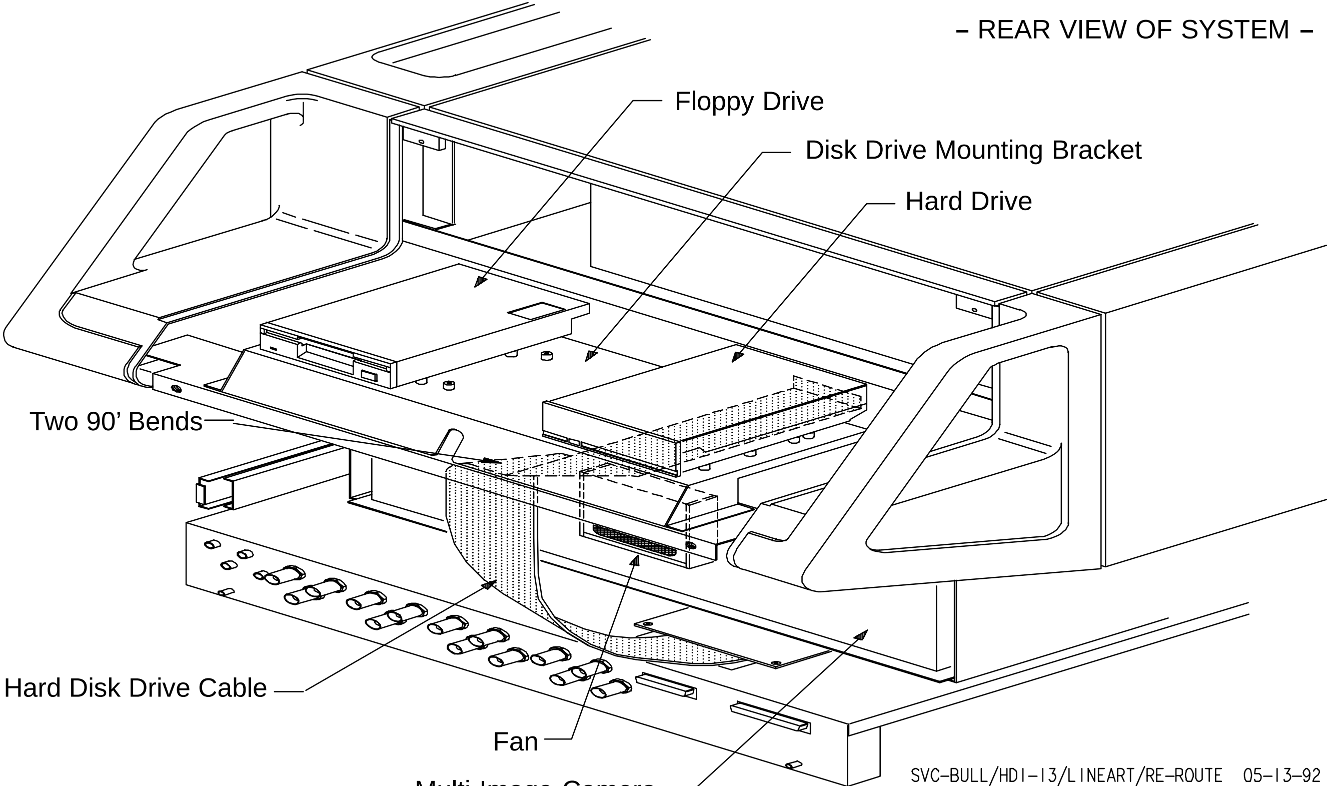

– REAR VIEW OF SYSTEM –
Floppy Drive
Disk Drive Mounting Bracket
Hard Drive
Two 90’ Bends
Hard Disk Drive Cable
Fan
Multi-Image Camera
SVC–BULL/HDI–13/LINEART/RE–ROUTE 05–13–92

Figure 1

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ■ NO ☐

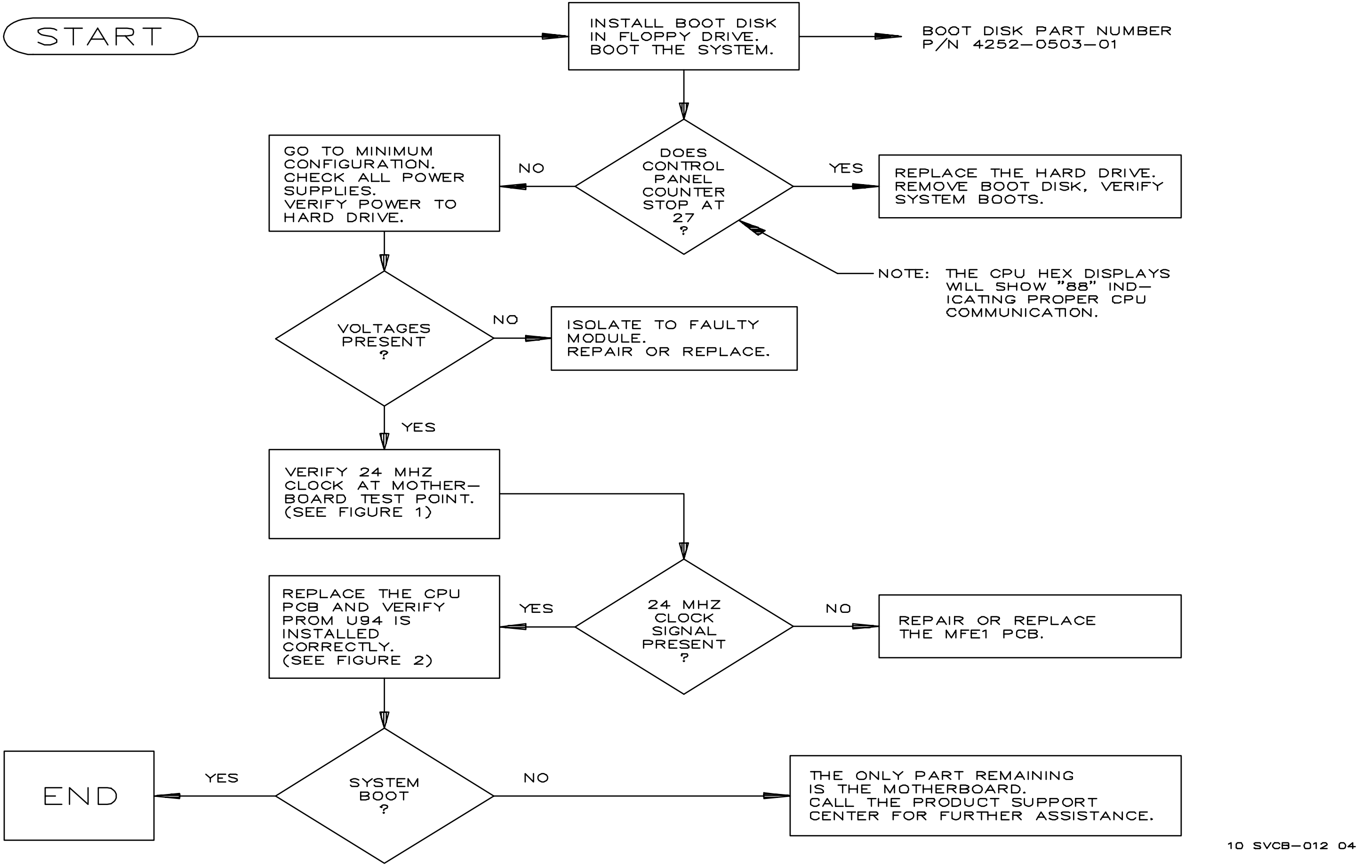
Service Bulletin

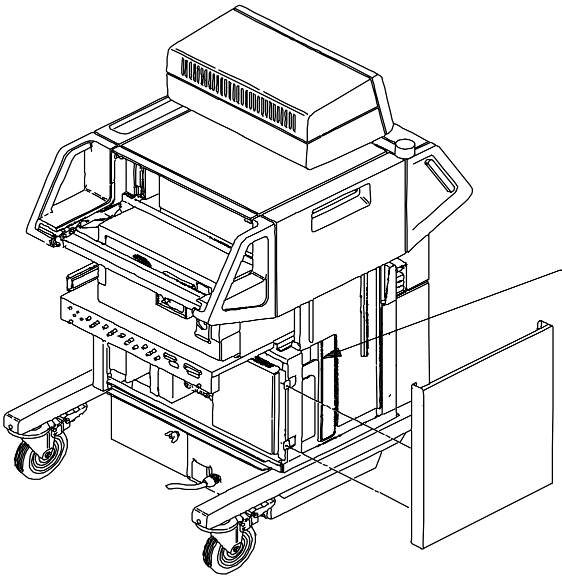
Date: August 19, 1992
To: All Field Service Personnel
Author: Darrell Jacoway

S.B. No.: HDI–15 Rev: A
E.C.N. No.:

Troubleshooting a Non-Booting UM-9 HDI

This bulletin supercedes S.B. HDI--15.


START
INSTALL BOOT DISK IN FLOPPY DRIVE. BOOT THE SYSTEM.
BOOT DISK PART NUMBER P/N 4252-0503-01
DOES CONTROL PANEL COUNTER STOP AT 27 ?
NO
YES
REPLACE THE HARD DRIVE. REMOVE BOOT DISK, VERIFY SYSTEM BOOTS.
NOTE: THE CPU HEX DISPLAYS WILL SHOW "88" INDICATING PROPER CPU COMMUNICATION.
GO TO MINIMUM CONFIGURATION. CHECK ALL POWER SUPPLIES. VERIFY POWER TO HARD DRIVE.
VOLTAGES PRESENT ?
NO
ISOLATE TO FAULTY MODULE. REPAIR OR REPLACE.
YES
VERIFY 24 MHZ CLOCK AT MOTHERBOARD TEST POINT. (SEE FIGURE 1)
24 MHZ CLOCK SIGNAL PRESENT ?
YES
REPLACE THE CPU PCB AND VERIFY PROM U94 IS INSTALLED CORRECTLY. (SEE FIGURE 2)
NO
REPAIR OR REPLACE THE MFE1 PCB.
SYSTEM BOOT ?
YES
END
NO
THE ONLY PART REMAINING IS THE MOTHERBOARD. CALL THE PRODUCT SUPPORT CENTER FOR FURTHER ASSISTANCE.
10 SVCB-012 04



– LEFT SIDE VIEW OF SYSTEM –

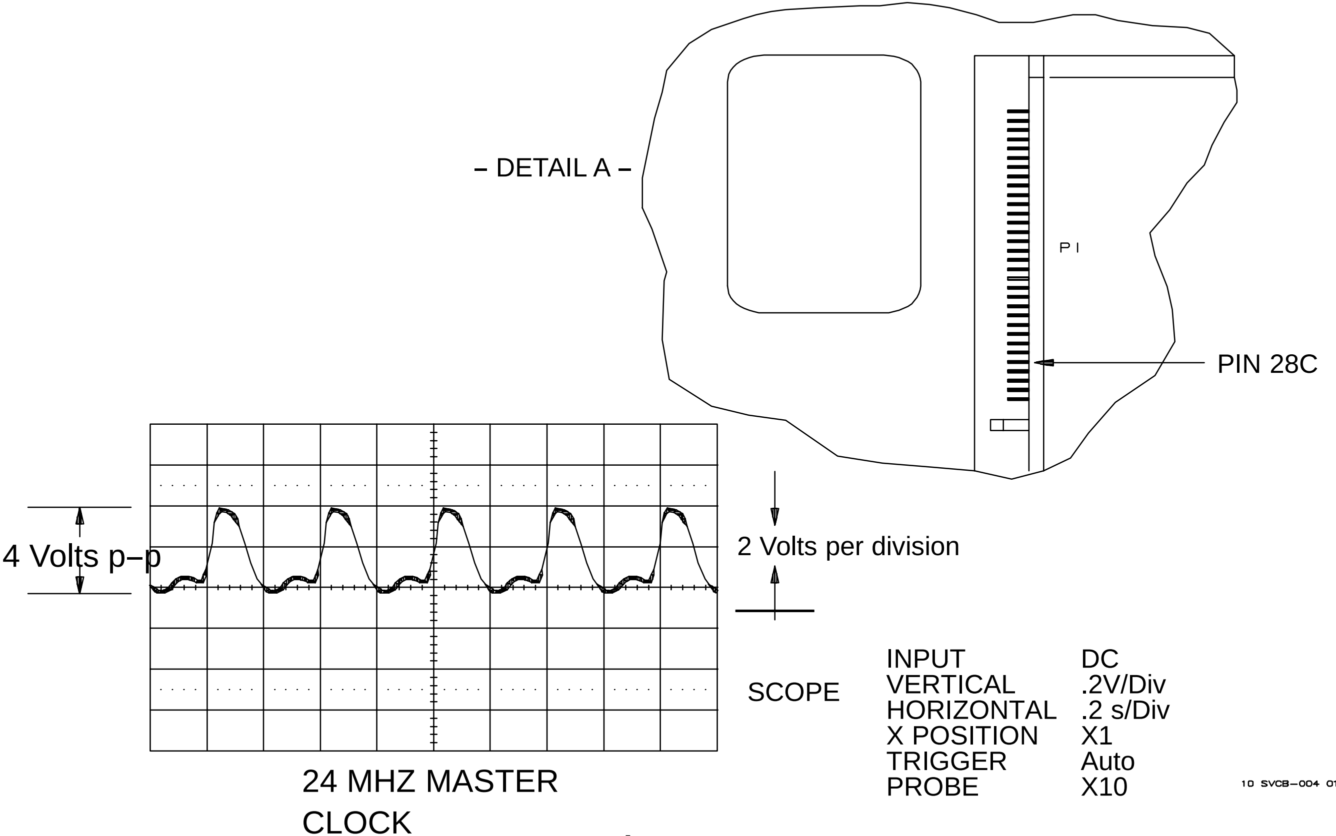

– DETAIL A –
P I
PIN 28C
4 Volts p–p
2 Volts per division
SCOPE
INPUT DC
VERTICAL .2V/Div
HORIZONTAL .2 s/Div
X POSITION X1
TRIGGER Auto
PROBE X10
24 MHZ MASTER
CLOCK
10 SVCB–004 01

Figure 1

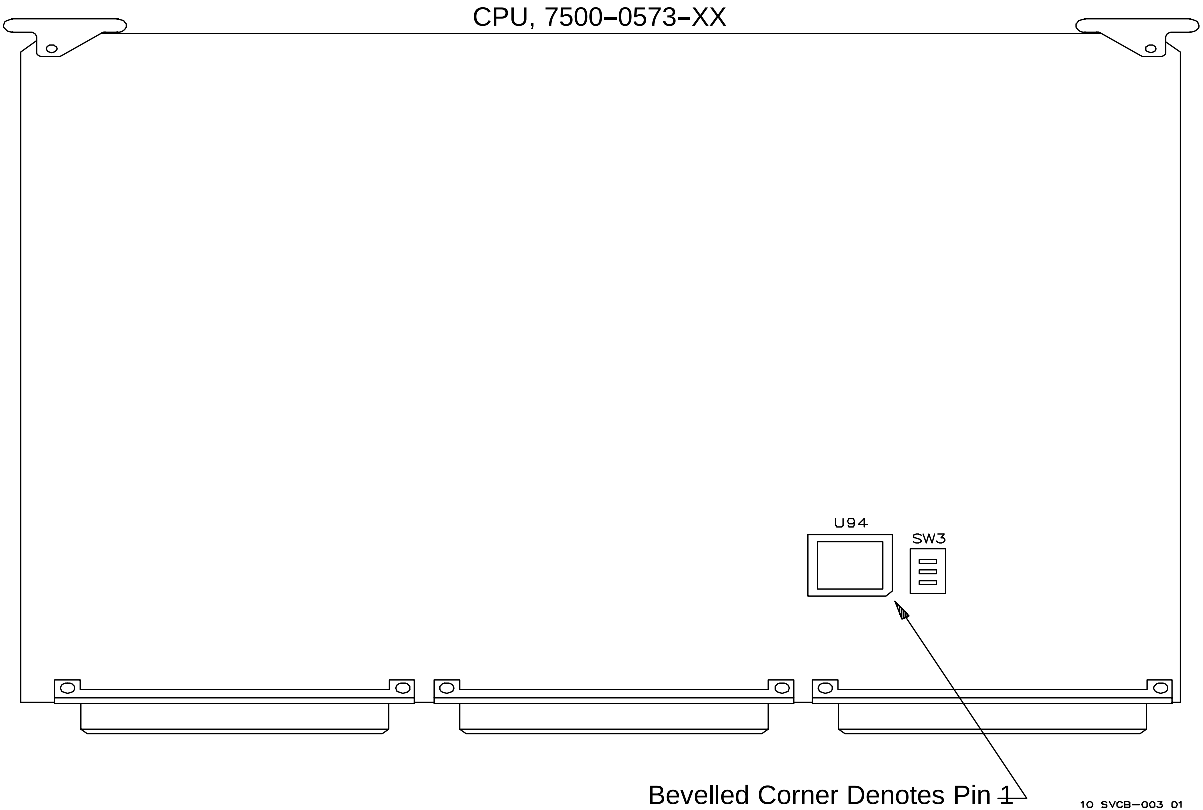

CPU, 7500−0573−XX
U94
SW3
Bevelled Corner Denotes Pin 1
10 SVCB−003 01

Figure 2

WITH ATTACHMENTS: YES ■ NO □
WITH PARTS: YES □ NO ■

Service Bulletin

Date: June 4, 1992 S.B. No.: HDI–16 Rev:
To: All Field Service Personnel E.C.N. No.:
Author: Jerry Norimatsu

Intel 8031 Slave Microprocessor ICs (ATL P/N 2042-0003) (UM-9 CFII/ UM-9 HDI)

PROBLEM: Potential system problems with the Intel 8031 IC part marked with a "A" suffix at the end of the FPO number.

1. CSRs should check the list of known UM-9 CFII and HDI systems that have shipped with this microprocessor and order several 8031 ICs for your stock.

2. If the sales order number matches to your data base, verify on a next call basis that the PCBs listed below do not have the potential defective part (8031) installed.

3. Replace the 8031 part.

Part Number	Description	Slot	Location	CFII	HDI
7500-0527-XX	System CPU	A3/A4	U19	X	X
7500-0382-XX	Spectral Est.	A15/A13	U72	X	X
7500-0556-XX	Frame Grabber	A9	U11	X	X
7500-0692-XX	EIM	A18/15	U4	X	X
7500-0573-XX	System CPU	A3			
112-25326-XX	Graphics Static	A5	U124	X	
7500-0515-XX	Graphics BW	A6/A4	U124	X	X
7500-0514-XX	Graphics Color	A7/A6	U124	X	X
7500-0392-XX	RF Input Module	A19	U78	X	
7500-0493-XX	Motor Cont.	A20	U1	X	
7500-0573-XX	System CPU	A3	U19	X	X
7500-0671-XX	M-Mode Physio	A2/A3	U18/U19	X	X

NOTE: *If the 8031 is not on a socket, replace the PCB. It is to be reworked at ATL. State the reason for return on the R92 form.*

NOTE: *Do not rework the PCB in the field if the 8031 is mounted and soldered on the PCB.*

Attachment

CSR	SO#	CUSTOMER
313	HD065	ST. JOSEPH HOSPITAL
331	V104919	EDWARD HINES HOSPITAL
333	U104938	DOCTORS HOSPITAL
334	104946	COMMUNITY HOSPITAL NORTH
336	104939	CLEVELAND CLINIC FOUNDATION
340	104912	DEKALB MEMORIAL HOSPITAL
358	104948	ST. JOSEPH HOSPITAL
	M01871	ATL UNIT AT P.A. HOSPITAL
415	HD070A	BARTLETT MEMORIAL
424	HD125	LATTER SAINTS HOSPITAL
434	U104866	LIFESCAN CORP.
435	U104544A	BEVERLEY RADIOLOGY
	U104546A	W. CHESTER RADIOLOGY
	104548A	ROXANNE RADIOLOGY
	U104545A	NORTH HOLLYWOOD
438	U104547A	NORTHRIDGE DIAGNOSTICS

437	104590A	KUAKINI PLAZA RAD.
	104900	FRANK VORALIK
444	104911	DEL AMO DIAGNOSTICS CTR.
445	HDI05	SCRIPPS MEMORIAL
512	104209	OUTPATIENT DIAGNOSTICS
	104930	MIAMI CHILDRENS HOSPITAL
517	104929A	FLORIDA HOSPITAL
524	U104867	HEALTHRUST INC. @ PITTSBURG LAMARR
526	HD053	THOMAS HOSPITAL
528	HD064	DEACONESS HOSPITAL
538	HD102	MED. U. OF SOUTH CAROLINA
551	WU104891	KINGS DAUGHTERS HOSPITAL
555	104945	DEPAUL MED. CTR.
	104933	CHESAPEAKE GENERAL HOSPITAL
611	HD099	CHILDRENS HOSPITAL
613	104878	ST. JOSEPH HOSPITAL
618	104909	DECATUR COUNTY HOSPITAL

619	V104817A	EHRLING BERGQUIST ASAF
	HD111	U. OF NEBRASKA
	HD110	U. OF NEBRASKA
623	104687A	U. OF MO. MEDICAL CTR.
643	104890	OKLAHOMA MED. CTR.
646	HD109	USAF MED. CTR. WILFORD HALL
659	HD104	U. OF TEXAS
674	V104956	PBO MUNSON COMM. HOSPITAL
676	HD021	SWEDISH MEDICAL
	HD022	SWEDISH MEDICAL
	HD103	NORTH COLORADO MED. CTR.
869	T104807A	FLUSHING HOSPITAL
871	104913	WEST SIDE RADIOLOGY
	HD054	CHILTON MEMORIAL HOSPITAL
874	104795	DR. GONZALES FREDRICK
	U104860	KAISER PERMANENTE
	104928	COMM. HOSP. @ DOBBS FERRY
	MHD077	ST. LUKES/ROOSEVELT
878	104776	DR. IRA BURGER
893	U104920	ST. ANDREWS HOSPITAL

896	104893	CHARLOTTE HUNGERFORD
899	104681B	ADVACARE MGMT.

INTERNATIONAL

C5954–2
C7763

X3995A
X7346A
X7443
X7556
X7565
X7566
X7574
X7582
X7586
X7589
X7617
X7624
X7627

X7677
X7681
X7685
X7694
X7695
X7736
X7737
X7740
X7789
X7790
X6108B
XU4009A
Z07499
Z07769
Z07770
Z07785
Z07786

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	September 30, 1992	S.B. No.:	HDI–17	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:	Jan Merkurieff			

FEC Diagnostic Error Codes During "RBS" Test

FEC error can isolate hardware faults on:

- Front End Controller PCB
- S/H Select PCB
- S/H Select Daughter PCB
- Channel Board PCB’s

7C020000000

The last four digits of the hex FEC error codes give the test identifier and error number. The test identifier occupies the first two digits.

7C020000000

From this information, a suspect PCB is isolated.

Example: At the “RBS” test, the following error code is displayed:

7C02005610

The test identifier indicates Channel PCB 7 as faulty.

10 SVCB–024 01

TEST IDENTIFIER CHART

01 FEC
02 FEC
03 FEC
04 FEC
05 FEC
30 PWR SUPPLY
31 S/H SELECT
32 HV ENABLE
33 S/H SEL. OR HV SUPPLY
34 S/H SEL. OR CHNL PCB
35 S/H SEL. DAU. PCB
36 CHANNEL PCB
37 S/H SELECT
38 FEC
39 FEC OR CHNL PCB 1 OR 2
3A CHNL PCB
40 CHNL PCB 0
41 CHNL PCB 1

42 CHNL PCB 2
43 CHNL PCB 3
44 CHNL PCB 4
45 CHNL PCB 5
46 CHNL PCB 6
47 CHNL PCB 7
48 FEC
49 FEC
4A FEC
4B FEC
4C FEC
4D FEC
4E FEC
4F CHNL PCB 0
50 CHNL PCB 1
51 CHNL PCB 2
52 CHNL PCB 3
53 CHNL PCB 4

54 CHNL PCB 5
55 CHNL PCB 6
56 CHNL PCB 7
57 CHNL PCB 0
58 CHNL PCB 1
59 CHNL PCB 2
5A CHNL PCB 3
5B CHNL PCB 4
5C CHNL PCB 5
5D CHNL PCB 6
5E CHNL PCB 7

NOTE: 34, 35 could also be FEC or S/H Select Dau. PCB.

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

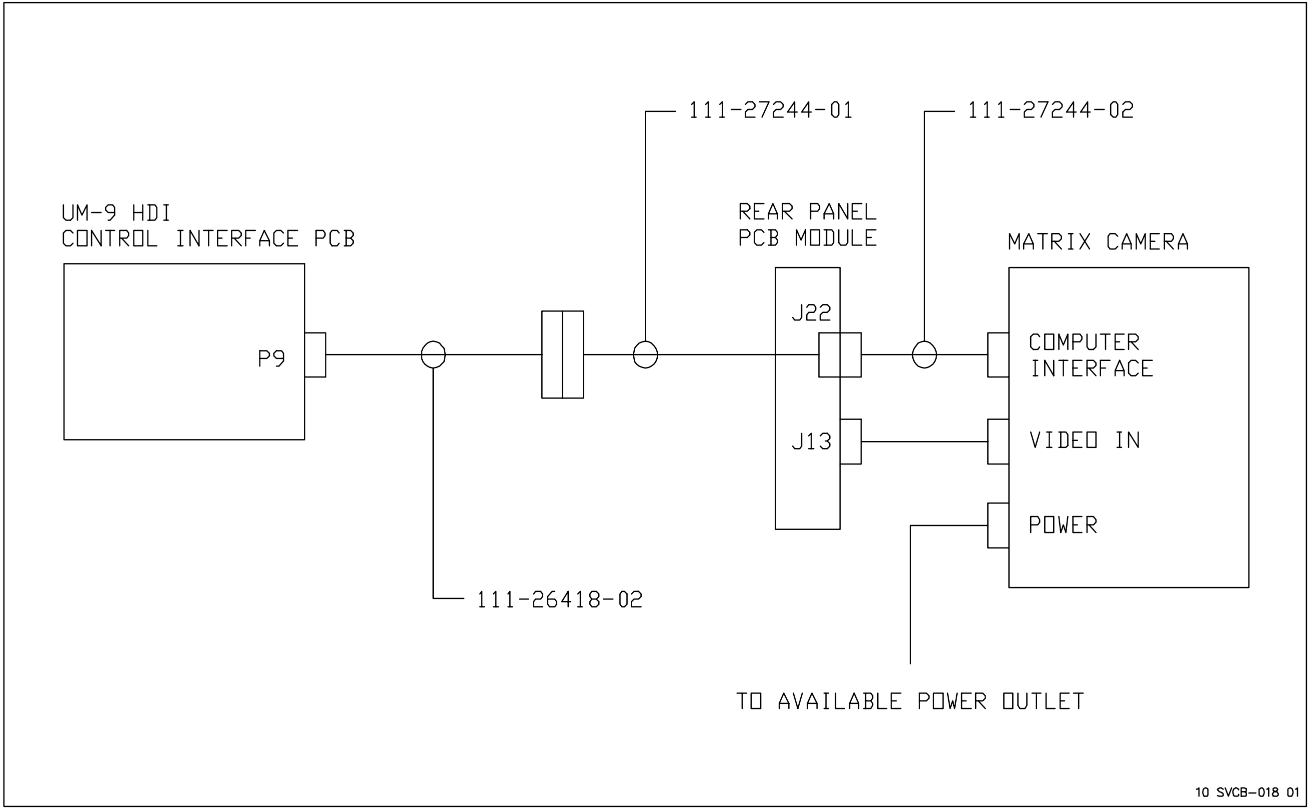
Date:	November 13, 1992	S.B. No.:	HDI–18	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:	Greg Farnworth/Fred Van Ryn			

UM-9/HDI System Interface with External Matrix 1010 Camera

PROBLEM: Externally mounted Matrix 1010 cameras do not have an interface connector provided on the rear panel or cover.

EFFECTIVITY: UM-9/HDI systems where the customer desires an externally configured Matrix 1010 camera.

SOLUTION: Order the three cables in the drawing below and configure as shown. Cable 111-27244-01 has a connector and hardware that will fit the blank cut-out at location J22 of the rear panel.


111-27244-01
111-27244-02
UM-9 HDI
CONTROL INTERFACE PCB
REAR PANEL
PCB MODULE
MATRIX CAMERA
J22
P9
COMPUTER
INTERFACE
J13
VIDEO IN
POWER
111-26418-02
TO AVAILABLE POWER OUTLET
10 SVCB-018 01

WITH ATTACHMENTS: YES ■ NO □
WITH PARTS: YES □ NO ■

Service Bulletin

Date: November 13, 1992
To: All Field Service Personnel
Author: Laurence J. Simanek

S.B. No.: HDI–19 Rev:
E.C.N. No.:

M-Mode Distance Measurement Error in HDI Systems

Possible M-mode distance measurement error in HDI systems.

CAUSE: When in ZOOMED M-MODE, if the M-mode key is used instead of the freeze key to stop the scrolling display, a distance measurement error of up to 25% can occur depending on zoom factor and scanhead selected.

PROBLEM: All HDI systems. Effective immediately.

SOLUTION:
1. See attached letter to all ATL UM-9 HDI system users.

2. No correction until the release of the new system software.

3. On a next call or PM basis, ensure that the customer is aware of the issue and its work-around.

Material -- Non required

Process

This service bulletin is to notify you of the problem. No solution is available until the release of the next software build (10.4X).

The work-around is to use the FREEZE key to stop the Zoomed M-mode scrolling display.

NOTE: *DO NOT USE THE M-MODE KEY FOR THIS FUNCTION.*

Notification -- None required

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	February 3, 1993	S.B. No.:	HDI–23	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:	Jim Doedens, Jan Merkurieff and Jim Baruzzini			

Troubleshooting Tips for the UM-9 HDI System

PROBLEM: Random “Power Monitor Fault” messages

CAUSE: Loose Scanhead Select Daughter Board screws

SOLUTION: The top screw on the Scanhead Select Daughter Board must be tight and the solder joint on the ground strap to TP1 in good condition, or random “Power Monitor Fault” errors may occur.

PROBLEM: "Power Monitor Fault" message occurs when using any foot switch or when printing to MIC without pressing FRZ.

EFFECTIVITY: Software builds 8.79 and below

CAUSE: Delay too short and the FEC gets confused.

SOLUTION: This problem is a timing problem and has been corrected in the Level 3 Software build (version 1043B); DO NOT REPLACE ANY PARTS FOR THIS PROBLEM.

PROBLEM: Random color flashes all over color box

CAUSE: Crystal oscillator Y1 on FEC PCB (7500-0570-07/08/10) with date code of "3392"

SOLUTION: Replace FEC PCB (P/N 7500-0570-11). (The -11 PCB does not exhibit problem.)

PROBLEM: Random color dots with L10- -5 scanhead

CAUSE: LH Digital Power Supply has greater than 50mV noise on the 5VDC power bus. (NOTE: use 1:1 probe to scope power supply.)

SOLUTION: Replace the Digital Power Supply (P/N 3500-1237-03).

PROBLEM: Random color lock-ups; CDP fails test; or no color

CAUSE: On CDP, check U19 is a “PAL” and not a “GAL” and that the “PAL” is not a “CYPRUS”

On CDP, check U63 is a “PAL” and not a “GAL” and that the “PAL” is not a “CYPRUS”

On CDP, check U10 is a “PAL” and not a “GAL” and that the “PAL” is not a “CYPRUS”

SOLUTION: Replace CDP PCB if any of the above conditions exist.

PROBLEM: No color specks at 94% and lower Color Gain

CAUSE: Bad Channel PCB

SOLUTION: Isolate individual Channel PCB using Front End diagnostics (see OFE Test, Section 4- -3.7 of the Ultramark 9 HDI Field Service Manual, P/N 4720-0013-02) and replace Channel PCB.

PROBLEM: Plasma Display blanks out or has “garbage” displayed on “BOOT-UP”, or intermittent Control Panel lock-up.

CAUSE: LH Digital Power Supply 12VDC vs 5VDC initializing incorrectly

SOLUTION: Replace Digital Power Supply (P/N 3500-1237-03).

PROBLEM: Noise on B/W Monitor

CAUSE: Can be caused by Color Monitor. Turn Color Monitor “OFF” to see if noise in B/W monitor goes away.

SOLUTION: Replace Color Monitor.

More Tips and Hints:

1. Color mode ’jailbars’ or streaks are usually caused by Channel PCBs. This can be difficult to isolate to the board, but try this procedure:

   a. “WALK 0” thru the Boards, not Channels, first using Transmit Controls. Next Enable All Elements.

   b. “WALK 0” using the Receive Controls. It may be necessary to make a third pass to isolate the board.

   c. “WALK 0” setting the Transmit and Receive to the same Channel PCB location, this will disable both the transmit and receive to that board and effectively shut it “OFF”, and any effect it has on the image.

If this procedure does not isolate the problem PCB, replace the Channel boards one at a time. This problem has been seen when the AC line voltage drops below 105Vrms.

2. Drop-outs should be verified by moving the scanhead to the adjacent ports and repeating Channel transmit and receive tests. The relays on the Scanhead Select PCB can stick in one position.

3. Random Front Panel lock-ups can be traced to the Frame Grabber or Graphics PCBs.

4. Intermittent Control Bus lock-ups can be caused by the VCR. The VCR has access to the Control Bus through the AVP PCB. This can be an extremely difficult problem to isolate due to the intermittent nature of the problem and the appearance that the VCR is working properly. Interrogating the Error Handler, Error Logger, viewing the control signals with an oscilloscope, and individual persistence are the best tools available for this problem.

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date: March 5, 1993
To: All Field Service Personnel
Author: Steve Carter

S.B. No.: HDI–24 Rev:
E.C.N. No.:

Scanhead Disconnect Message With A6–3 Scanhead on the UM-9 HDI

PROBLEM: Intermittent scanhead disconnect message when using the A6- -3 scanhead only.

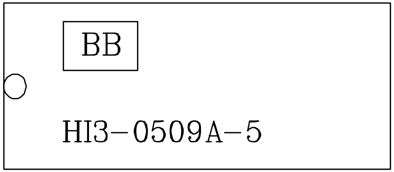
CAUSE: U13 on some 7500-0617-03 Motor controller PCBs built since July 1992 may be an improper component.

SOLUTION:

1. If the customer is complaining of intermittent scanhead disconnect errors on the A6- -3 scanhead only, replace the Motor Controller PCB. Scanhead disconnect errors on other scanheads point to some other system problem and will not be corrected by replacing the Motor Controller.

2. On a next call basis, if the CSR has the UM-9 HDI system open, verify that U13 on the Motor Controller PCB (A16 “Old” Backplane/A18 “New” Backplane) **does not have the following markings:**

3. If U13 does have the markings shown above, this Motor Controller PCB needs to be replaced with a 7500-0617-04 or Higher PCB.



10 SVCB−031 01

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	March 23, 1993	S.B. No.:	HDI–26	Rev:
To:	All Field Service Personnel	E.C.N. No.:		
Author:	Noel Joseph			

B/W Digital Storage and B/W Laser Printer Interface (UM-9/HDI Systems)

PROBLEM: Erratic video to the B/W digital storage and B/W laser printer.

CAUSE: Incorrect hard copy device selected in the ultrasound system.

SOLUTION: Connect the B/W digital storage unit or B/W laser printer to J13 on the rear panel on all UM-9 and HDI systems.

With Phase 1 and Phase 2 UM-9 systems below 7.55 software and with Level 2 HDI systems, make sure the customer is selecting the external B/W printer as the

hard copy device, and has selected the left or right monitor before using the digital storage unit or laser printer.

With Phase 2 UM-9 systems above 7.59 software and Level 3 HDI systems, select the external B/W printer as the default hard copy device. If another hard copy device is selected, advise the user to return the system to external B/W printer before using the digital storage unit or the laser printer.

WITH ATTACHMENTS: YES ■ NO ☐
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	June 8, 1995	S.B. No.:	HDI–29 Rev: B
To:	All Field Service Personnel	E.C.N. No.:	
Author:	Jerry Norimatsu		

3M Digital Image Manager Service Protocol

This bulletin supercedes S.B. HDI--29 Rev A.

1.0 INTRODUCTION

This bulletin is written in conjunction with NPB--68, 3M Digital Image Manager for UM-9 DP/UM-9 HDI.

2.0 SUMMARY

3M Digital Manager Model No. 6002

- The 3M Digital Image Manager is an OEM Digital Laser Camera manufactured by 3M Medical Imaging Systems.
- The 3M Digital Manager is sold by ATL with the UM-9 CFII and HDI systems.
- External configuration only
- No internal configuration available
- There is a one-year warranty on all new 3M Digital Imagers from the day of the installation. Coverage is provided by 3M Medical Imaging Systems.
- 3M Digital Image Managers are not covered under any ATL maintenance agreements.
- Billable customers will provide 3M with their own purchase order number for service.
- Inform customers of the ATL service policy and provide them with the 3M service number.
- All service will be provided by 3M Medical Imaging Division.
- For 3M Technical Assistance or Dispatch, call 1-800-323-4118 U.S or Canada.

- A purchase order number is required before servicing 3M Digital Imagers connected to ATL demo systems. Call the ATL Sales Department for a purchase order number.

- If you have problems with the purchase order number, call the ATL Purchasing Department at extension 8128.

3.0 SERVICE ON ATL SALES DEMO UM-9 CFII/HDI SYSTEMS

If Sales wants service on the 3M Digital Image Manager, follow the procedure below:

4. Isolate the problem to 3M Digital Image Manager or the ATL ultrasound system. See the fault isolation procedure on page 3.

5. If the 3M Digital Image Manager is at fault, follow the procedure below:

   a. Open a service call on the dispatch network with the following information:

      (1) Serial number of the UM-9 CFII/HDI and the 3M Digital Image Manager.

(2) Phone number and address where the contact can be reached. Make sure the system is not moving to another site. If so, get the fowarding address from the ATL Sales Rep.

b. Call 3M Dispatch at 1-800-323-4118 and provide 3M with the following information:

(1) Contact and address

(2) Serial number of the system and 3M Digital Image Manager

(3) 3M Digital Image Manager Model No.6002

c. Phone mail the Customer Service and Sales Representative with the estimated time of arrival of the 3M Service Representative.

6. If the UM-9 CF II/HDI system is down, open a service call on the dispatch network.

4.0 NEW INSTALLATIONS

- The CSR is responsible for installation of the UM-9 system.
- The CSR is responsible for calling 3M Dispatch to install and interface the Digital Image Manager to the UM-9 system.

- The CSR will provide 3M with all customer information and purchase order number for service.

- If the customer calls ATL for 3M Digital Image Manager installation, open a service call for the CSR. Call 3M Dispatch and provide 3M with all the installation information.

NOTE: *The CSR may set up the 3M Digital Image Manager for the customer, but is not responsible for service.*

5.0 ATL UM-9 CFII/HDI 3M IMAGE DIGITAL MANAGER FAULT ISOLATION

Make sure the UM-9 or HDI system software is configured correctly for an external 3M Digital Image Manager.

The UM-9 and HDI software should be configured for the following:

- External black and white printer (standard feature)

- External color page printer (standard feature)

If the system is not configured properly, open a service call or talk to the Product Support Center Technical Support Division for more information on proper system configuration.

Verify the 3M Digital Manager is properly connected to the UM-9 or HDI system rear panel:

UM-9 HDI System Rear Panel Connection	3M Digital Image Manager	
J6 (composite video) out to	system in (video in)	
OR		
J13 (green video) out[1]	to	system in (video in)
J9 (on-screen programming)	to	video out

1. Must use J13 in order to select the left or right monitor video. Use a 75 ohm BNC video cable for all video connections.

To determine if the 3M Digital Image Manager or the UM-9 HDI System is at fault, follow the procedure below:

1. On the UM-9/HDI system get to the hardkey “Setup” button.

2. Use the “up-down” arrow keys on the “Hardcopy Devices” menu.

3. Select the “External Color Page Printer” menu.

4. Disconnect J6 or J13 (Video Out rear panel) and the Video In cable from the 3M Image Manager.

5. Disconnect J9 from the UM-9 HDI rear panel.

6. Connect the BNC cable from J6 or J13 to J9 of the rear panel.

7. Use the “EXT OEM DISPLAY” key on the plasma display to toggle the video from the monitor and rear panel. This will loop the rear panel video to the color monitor of the UM-9 HDI system.

If the screen is blank when toggling between live video and the rear panel video, then the system is at fault.

If the video toggles between live video and the rear panel, then the 3M Digital Image Manager is at fault.

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	April 1, 1994	S.B. No.:	HDI–35	Rev:	C
To:	All Field Service Personnel	C.O. No.:	3854, 100095, 100132		
Author:	Dean Fink				

Release of 13.19 and 13.18 Software Change History (UM-9 HDI System)

NOTE: *This service bulletin supercedes HDI-35 Rev B.*

This service bulletin documents 13.19 software and the changes between 13.18, 13.18A, 13.18C, 13.18F, 13.18G, and 13.18H software on the UM-9 HDI. This bulletin is effective until the changes are incorporated into the next service manual change (4725-0013-16, expected delivery in April, 94). Figure 1 illustrates the software development path for 13.18 and 13.19 software.

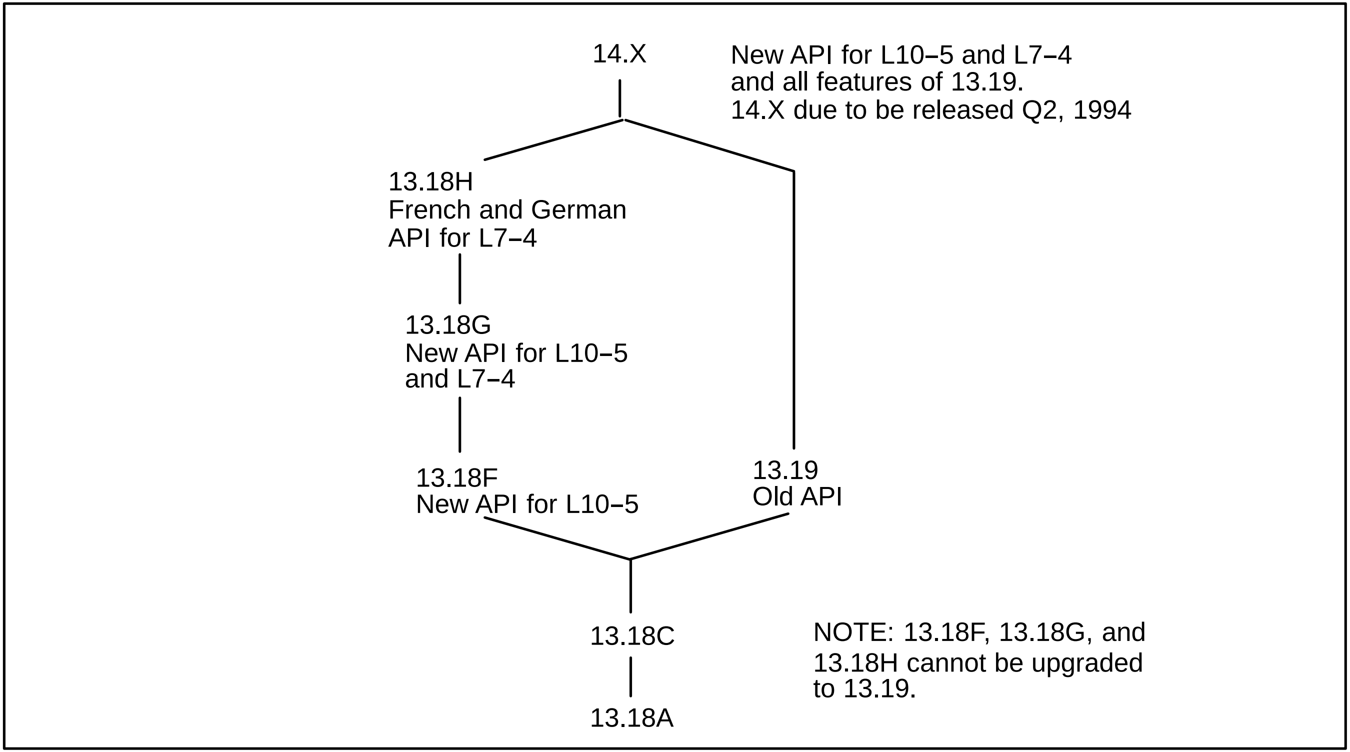


Figure 1. 13.18/13.19 Software Development Path

The following information summarizes the status of 13.18 and 13.19 software:

13.19	Targeted upgrades only -- in the field on 1/28/94
13.18	NRR of Level 5 systems -- should have been upgraded to
13.18C	
13.18A	RFD of Level 5
13.18B	Not in the field
13.18C	FCD of Level 5
13.18D and E	Not in the field
13.18F	Released 2/25/94 to allow shipments of L10--5 scanheads
13.18G	Released 3/18/94 to allow shipments of L10--5/L7--4 scanheads
13.18H	Released 4/1/94 to correct API on French and German L7--4 scanheads.

13.19

This software version was released for distribution (RFD released) on January 28, 1994, to upgrade targeted customers to Custom Upgrade features. The Custom Upgrade includes the following features and changes to system operation:

- Extended Signal Processing (ESP)
- C4--2 40R curved array scanhead support

- C7--4 curved array scanhead support
- P5--3 phased array scanhead support
- Doppler and M-Mode user interface enhancements
- VCR control interface fixes
- Patient name and date will now be displayed on OB graphs
- Adds Doppler Power Imaging
- Fixes the software so it correctly identifies the end diastolic peak when making measurements using High Q™ Automatic Doppler Analysis
- Removes the High PRF feature
- Does not support Frame Grabber or VCR Tape Directory

13.19 software does not include the API changes made for the L10--5 scanhead on 13.18F software or the L7--4 scanhead on 13.18G software. There is no upgrade from 13.19 software to 13.18F, 13.18G or 13.18H. The new API files for the L10--5 and L7--4 scanheads will be incorporated into the 14.X software baseline. The scanheads are operational with the old API files.

Software version 13.19 is not for new build systems, nor will it be used as a software baseline. It is an interim step to improve the performance of specific systems. Information on this software version will be documented in the next service manual change (4725-0013-16).

The upgrade will be available only to customers who ordered one of the above features during 1993. Upgrade orders placed in 1994 will be supported by the 14.X baseline during Q2, 1994. The following part numbers were unique to the release of 13.19 software.

Part Number	Description
4252-0680-30	Hard Drive, English, 13.19
4252-0684-10	Hard Drive, French, 13.19
4252-0688-10	Hard Drive, German, 13.19
8000-0898-04	PROM Kit, ADDA, 13.19
4201-1542-05	PROM, ADDA, U11, 3FDB
8000-0932-02	PROM Kit, CPU, 13.19
4201-0825-01	S PROM, CPU, U20, F444
4201-1552-01	S PROM, CPU, U66, 6EFB
4201-1353-03	S PROM, CPU, U94, 47F9
8000-0918-07	PROM Kit, Advanced Frame Grabber, 13.19
4201-1535-13	S PROM, AFG, U27, EDDF
4201-1536-04	S PROM, AFG, U81, AOCC

8000-0897-05	PROM Kit, AVP, 13.19 (For 3500-1200/1201-03, 04 and 3500-1444-01 AVP with 7350 VCR only)
4201-1576-05	S PROM, AVP, U28, 05D3
4201-1541-04	S PROM, AVP, U80, F633
8000-0947-03	PROM Kit, AVP, 13.19 (For 3500-1200/1201-01,-02 AVP with 7350 VCR only)
4201-1587-03	S PROM, AVP, U10, 49FB
4201-1588-04	S PROM, AVP, U34, 9B8D
8000-0963-01	PROM Kit, AVP, 13.19 (For 3500-1200/1201-03,-04 and 3500-1444-01 AVP without 7350 VCR)
4201-1681-01	S PROM, AVP, U28, 321E
4201-1541-04	S PROM, AVP, U80, F633
8000-0953-01	PROM Kit, AVP, 13.19 (For 3500-1200/1201-01,-02 AVP without 7350 VCR)
4201-1587-03	S PROM, AVP, U10, 49FB
4201-1591-01	S PROM, AVP, U34, ADA9
8000-0968-01	PROM Kit, IFOM, Stand-alone, 13.19

4201-1367-02	S PROM, IFOM, U88, CD34
4201-1561-01	S PROM, IFOM SCIP, U140, 6EC3

13.18

Software version 13.18 was released on October 29, 1993, to support non-revenue release (NRR) Level 5 systems (demo systems only). The software version includes the following features and changes to system operation:

- P5--3 phased array scanhead support (ESP and non-ESP systems)
- P3--2 phased array scanhead support (ESP cardiology applications)
- System hardware and software changes to support future release of DAASR® module
- Changes to diagnostics (Engineering tests in the PRODUCTION SERVICE PANEL)
- Adds Doppler Power Imaging
- Corrects Doppler and M-Mode scaling errors
- Does not support Frame Grabber, VCR Tape Directory, or 4-on-1 Save/Recall

NOTE: *Doppler Power Imaging is a free customer upgrade. It will be included in the baseline upgrade (14.x) which is scheduled to be completed worldwide by March, 1995.*

The following part numbers were unique to the release of 13.18 software.

Part Number	Description
4252-0680-26	Hard Drive, English, 13.18
4252-0684-06	Hard Drive, French, 13.18
4252-0685-06	Hard Drive, German, 13.18
8000-0898-03	PROM Kit, ADDA, 13.18
4201-1542-04	S PROM, ADDA, U11, 3E56
8000-0918-05	PROM Kit, Advanced Frame Grabber, 13.18
4201-1535-11	S PROM, AFG, U27, 3291
4201-1536-03	S PROM, AFG, U81, 9AF6
8000-0897-03	PROM Kit, AVP, 13.18 (For 3500-1444-01 AVP – PAL)
4201-1576-03	S PROM, AVP, U28, 0115
4201-1541-04	S PROM, AVP, U80, F633
8000-0947-02	PROM Kit, AVP, 13.18 (For 3500-1200/1201-04 AVP)

4201-1587-03	S PROM, AVP, U10, 49FB
4201-1588-03	S PROM, AVP, U34, 4868
8000-0932-01	PROM Kit, CPU, 13.18
4201-0825-01	S PROM, CPU, U20, F444
4201-1352-01	S PROM, CPU, U66, 6EFB
4201-1353-02	S PROM, CPU, U94, 29EE
8000-0945-01	PROM Kit, Master Scrolling Graphics, 13.18
4201-1583-01	S PROM, Master Scrolling Graphics, U67, 6E79
4201-1584-01	S PROM, Master Scrolling Graphics, U85, BB7B
4201-0827-02	S PROM, Master Scrolling Graphics, U123, 2F46
8000-0946-01	PROM Kit, Slave Scrolling Graphics, 13.18
4201-1585-01	S PROM, Slave Scrolling Graphics, U67, 0E50
4201-1586-01	S PROM, Slave Scrolling Graphics, U85, B569
4201-0827-02	S PROM, Slave Scrolling Graphics, U123, 2F46
8000-0917-02	PROM Kit, Spectral Estimator, 13.18
4201-1538-02	S PROM, Spectral Estimator, U53, 61B1

There should be no systems with 13.18 software remaining in the field. All systems with this software should be upgraded to 13.18C.

13.18A

Software version 13.18A was released on November 11, 1993, to support RFD shipments of Level 5 systems. It was based on 13.18 software and fixed four miscellaneous system problems. Refer to UM-9 HDI Service Manual Revision 4720-0013-03 for technical information. This software version supports the following features:

- All features of 13.18 software
- UM-9 HDI CV systems

The following part numbers were unique to the release of 13.18A software.

Part Number	Description
4252-0680-27	Hard Drive, English, 13.18A
4252-0684-07	Hard Drive, French, 13.18A
4252-0685-07	Hard Drive, German, 13.18A
8000-0918-06	PROM Kit, Advanced Frame Grabber, 13.18A

4201-1535-12	S PROM, AFG, U27, 3291
4201-1536-04	S PROM, AFG, U81, A0CC

13.18B

Software version 13.18B was for engineering development only. It was not released to the field.

13.18C

Software version 13.18C was released on November 22, 1993. The software version began first customer delivery (FCD) shipments of Level 5 systems. Refer to NPB 92 Rev B and UM-9 HDI Service Manual Revision 4720-0013-03 for technical information. The software version includes the following features and changes to system operation:

- All features of 13.18 and 13.18A software
- C4--2 40R curved array scanhead
- C7--4 curved array scanhead
- L7--4 linear array scanhead
- Corrects VCR write--protect problem
- Permits all broadband scanheads to operate on ESP and non-ESP systems

The following part numbers were unique to the release of 13.18C software.

Part Number	Description
4252-0706-06	Hard Drive, English, 13.18C
4252-0707-01	Hard Drive, French, 13.18C
4252-0708-01	Hard Drive, German, 13.18C
8000-0918-06	PROM Kit, Advanced Frame Grabber, 13.18C
4201-1535-12	S PROM, AFG, U27, DD45
4201-1536-04	S PROM, AFG, U81, A0CC
8000-0958-02	PROM Kit, AVP, 13.18C (For 3500-1200/1201-04 AVP)
4201-1576-04	S PROM, AVP, U28, 867C
4201-1541-04	S PROM, AVP, U80, F633

13.18D and 13.18E

Software versions 13.18D and 13.18E were for engineering development only. They were not released to the field.

13.18F

Software version 13.18F was released on February 25, 1994 to support production shipments (replaces 13.18C). The software incorporates all the features of 13.18C and adds new API tables for the L10- -5. Use of the L10- -5 scanhead with previous software versions is not affected by this release. If a customer has the L10- -5 back-ordered, the hard drive will be shipped with the scanhead. The hard drive is a direct replacement for the 13.18C hard drive. The new API tables will be incorporated into the 14.X software baseline.

This software version requires the PROM kits listed for 13.18C and the following part numbers.

Part Number	Description
4252-0706-07	Hard Drive, English, 13.18F
4252-0707-02	Hard Drive, French, 13.18F
4252-0708-02	Hard Drive, German, 13.18F

13.18G

Software version 13.18G was released on March 18, 1994 to support production shipments (replaces 13.18F). The software incorporates all the features of 13.18F

software and adds new API tables for the L7--4 scanhead. Use of the L7--4 scanhead with previous software versions is not affected by this release. If the customer has the L7--4 back-ordered, the hard drive will be shipped with the scanhead. The hard drive will be a direct replacement for the 13.18C or 13.18F hard drive. The new API tables will be incorporated into the 14.X software baseline.

This software version requires the PROM kits listed for 13.18C and the following part numbers.

Part Number	Description
4252-0706-08	Hard Drive, English, 13.18G
4252-0707-03	Hard Drive, French, 13.18G
4252-0708-03	Hard Drive, German, 13.18G

13.18H

Software version 13.18H was released on April 1, 1994 to correct API files in 13.18G French and German software versions (replaces 13.18G). A new hard drive was also released for English language systems to maintain concurrence with manufacturing. There are no software changes between 13.18G and 13.18H

for English language systems. Do not upgrade English language systems with 13.18G software to 13.18H.

Software version 13.18H incorporates all the features of 13.18G software. If the customer has the L7--4 back-ordered, the hard drive will be shipped with the scanhead. The hard drive will be a direct replacement for the 13.18C, 13.18F or 13.18G hard drive on French or German systems. The new API tables will be incorporated into the 14.X software baseline.

This software version requires the PROM kits listed for 13.18C and the following part numbers.

Part Number	Description
4252-0706-09	Hard Drive, English, 13.18H
4252-0707-04	Hard Drive, French, 13.18H
4252-0708-04	Hard Drive, German, 13.18H

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date: December 13, 1993 S.B. No.: HDI–36 Rev:

To: All Field Service Personnel C.O. No.:

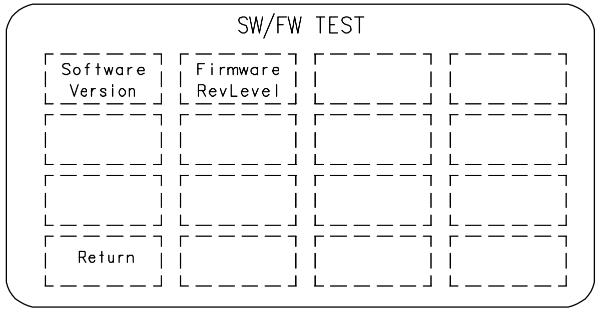
Author: Jan Merkurieff

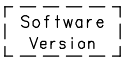
Software Version vs. Build Version for Level 5 UM-9 HDI Systems

The purpose of this Service Bulletin is to clear up some confusion regarding "Software Version" and "Build Version" when pressing "Software Version" on the SW/FW Test engineering test panel.

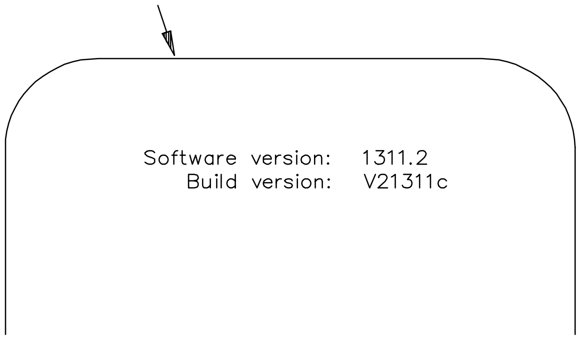
The "Software Version" number does not identify both software and hardware levels within a system. "Build Version" is the more complete number that details all data pertinent to a particular system, including firmware.

When reporting system configuration, be sure to report “Build Version” rather than “Software Version.”





Pressing "Software Version" displays the system software and build version on the left monitor. Build Version is the critical number.



10 SVCB-064 01

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	February 22, 1994	S.B. No.:	HDI–37	Rev:
To:	All Field Service Personnel	C.O. No.:		
Author:	Jan Merkurieff			

Scanhead Select Module P1 Connector Problem

PROBLEM: A6- -3 Scanhead damage

CAUSE: P1 on the Scanhead Select Module (SSM) installed backwards.

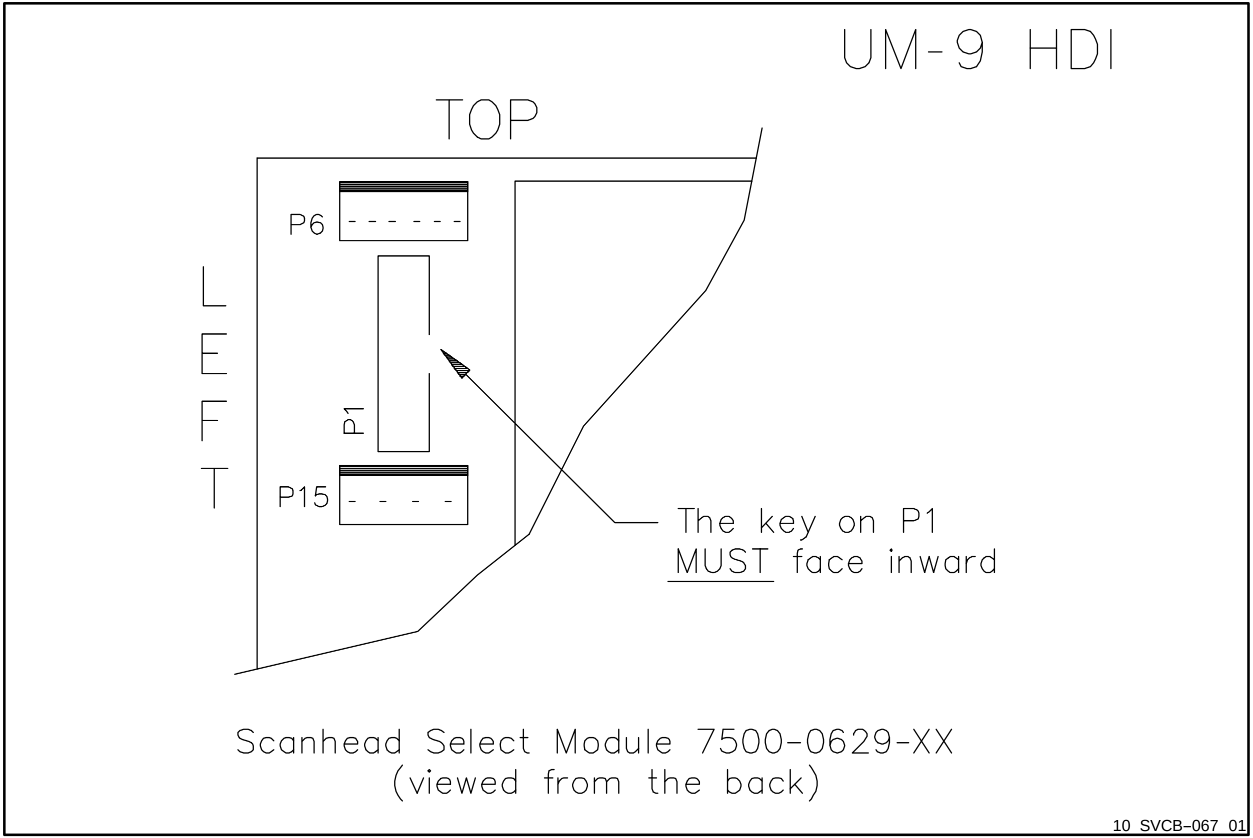
EFFECTIVITY: UM-9 HDI systems.

SOLUTION:

1. On a "next call basis", verify that P1 is installed with the center key pointed inward.
2. Check all stock on hand and all incoming SSM's to verify that P1 is installed with the center key pointed inward.

3. Before connecting an A6--3 to a system for an upgrade or demo, verify that P1 is installed with the center key pointed inward.

4. If P1 is incorrectly installed, replace the faulty SSM and return it to ATL.


UM-9 HDI
TOP
LEFT
P6
P1
P15
The key on P1
MUST face inward
Scanhead Select Module 7500-0629-XX
(viewed from the back)
10 SVCB-067 01

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date: January 6, 1994

To: All Field Service Personnel

Author: Darrell Jacoway

S.B. No.: HDI–38 Rev:

C.O. No.:

UM-9 HDI Steered CW Noise Bands

PROBLEM: Random noise bands appear in CW Doppler mode at sample rate settings of 38,462 and 31,250 cm/sec or frequency settings from 6 KHz to 14 KHz. The noise bands usually appear when the rear panel, speaker panel and side panels are installed on the system.

CAUSE: Poor ground contact between the speaker panel, side panels, and the system card cage.

SOLUTION: Before installing both strips, clean the surface area of the speaker panel with isopropyl alcohol. Add EMI finger shield strip, Part Number 3600-0242-01 to the speaker panel assembly in both locations indicated in Figure 1.

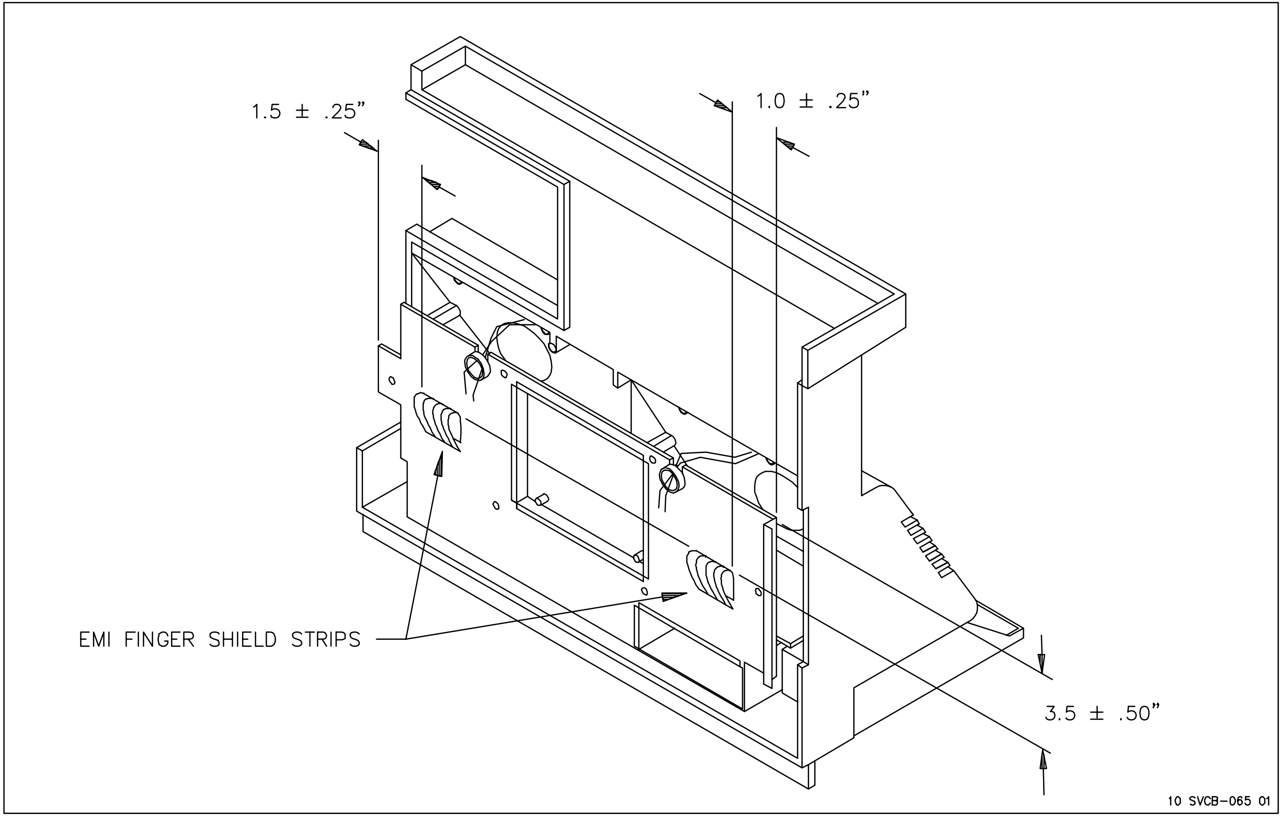


Figure 1. Speaker Panel Assembly

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	January 14, 1994	S.B. No.:	HDI–39	Rev:
To:	All Field Service Personnel	C.O. No.:		
Author:	Bach-Tuyet Nguyen			

UM-9 HDI t Control Panel Backlights

PROBLEM: Control Panel “SET” and “ENTER” push buttons do not light up when pressed.

CAUSE: The Control Interface PCB does not support backlighting for the “SET” and “ENTER” pushbuttons.

EFFECTIVITY: HDI Level 5 systems with Control Interface PCB P/N 7500-0757-03 will exhibit this problem.

SOLUTION: Replace 7500-0757-03 Control Interface PCB with -05 or replace Control Panel assembly P/N 3500-1520/1521-01 with -02.

NOTE: *This fix should only be implemented for customer satisfaction.*

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	March 14, 1994	S.B. No.:	HDI–40	Rev:
To:	All Field Service Personnel	C.O. No.:		
Author:	Jan Merkurieff			

UM-9 HDI Channel Scanhead Power Splitter (STE) P/N 4500-1618-XX

PROBLEM: Degraded Beamformer Channel outputs and/or short circuits between Scanhead Select ports.

SCOPE: Varies

SOLUTION: Verify Beamformer Channel outputs and Scanhead Select ports by following the STE procedures below:

PROCEDURE: Beamformer Channel Output Verification

System:

1. Connect the UM-9 HDI Channel Power Splitter to port “1” of the Scanhead Select.
2. Select a Fake C5 40R Transducer.
3. Set system controls to MaxPower/ Min Depth.
4. Perform a “Walk 1 Transmit Channel” Test.
5. Observe each channel on the oscilloscope for proper output (Figures 1 and 2).
6. Repeat procedures for each port.

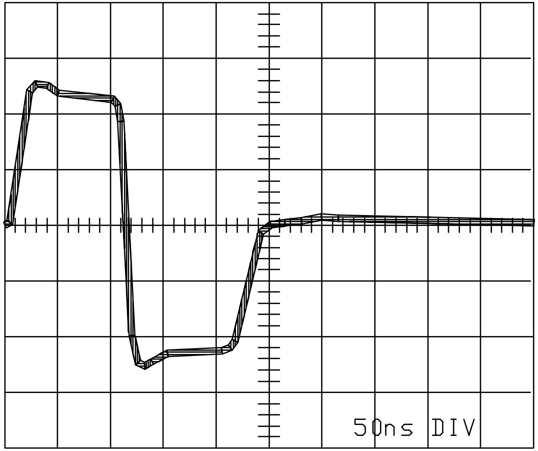


Figure 1. Typical waveform for all elements except 35, 36, 37, or 38.

System:

1. Vertical .5 V div
2. Horizontal 50 ns div

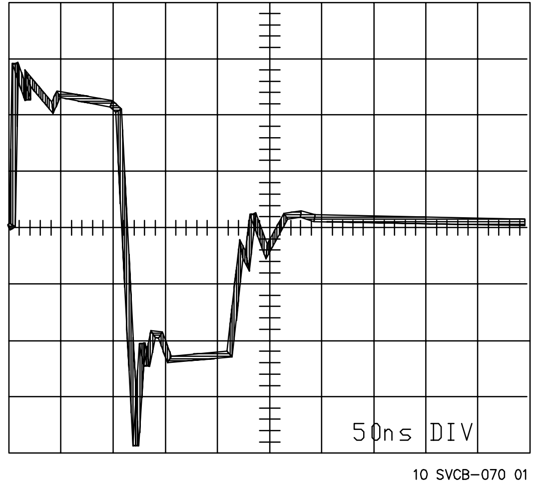


Figure 2. Typical waveform for elements 35, 36, 37, and 38.

All channels should be within 10% of the waveform displayed in Figure 1, which is a typical example of what you will see on the oscilloscope. Any deviations in amplitude, period, or the presence of excessive ringing or distortion are indicative of a defective Channel PCB. The only exceptions will be elements 35, 36, 37, and 38, which, due to system characteristics, will appear as shown in Figure 2. Once again, these channels should be within 10% of that displayed in Figure 2.

Although the Channel PCB is most likely at fault in the case of a demonstrated deviation, perform the same check on each port of the Scanhead Select to eliminate it as a possible contributor to the fault. If a Channel PCB is judged to be at fault, replace it.

PROBLEM: Beamformer Channel Output Verification

With a scanhead operating normally in one port, connect the STE to each of the open ports and verify that no activity exists. Activate the scanhead in each of the other ports in turn and use the STE as before to check the open ports. If any activity is noticed, replace the Scanhead Select. Shorted ports can cause image degradation.

WITH ATTACHMENTS: YES ■ NO □
WITH PARTS: YES □ NO ■

Service Bulletin

Date:	March 18, 1994	S.B. No.:	HDI–41	Rev:
To:	All Field Service Personnel	C.O. No.:	3836	
Author:	Laurence J. Simanek			

UM-9 HDI Multiple Noise Bands in Software 13.XX Systems at 5 MHz and 10 MHz Static CW

PROBLEM: Multiple Doppler noise bands occur in the image when using 5 MHz and 10 MHz Static CW scanheads with peripheral vascular setups.

SCOPE: UM-9 HDI systems with Data Ray monitors exhibiting the problem described.

EFFECTIVITY: All systems shipped prior to 2/4/94—the release date of CO-3836.

MATERIALS: Noise bands at 15 MHz are generated through radiation of horizontal oscillator noise by the Data Ray color monitor.

SOLUTION: Install the following parts on the 3500-0773-01 video cable.

Qty.	Part Number	Description
2	2604-0055-01	Ferrite Sleeve
1	2604-0056-01	Ferrite Sleeve Case

Procedure

1. Turn off power to the system.
2. Remove monitor cover.
3. Remove 1065-0678, upper screen.
4. Locate 3500-0773-01 Video Cable Assembly, Monitor Signal, CF, upper. See Assy. Instruction Sheet 32 & 33 attached.
5. Install both ferrite sleeves and the case on the video cable near the AMP coax connector. These parts are snap assembled together and readily removable. They do not change the configuration or part number of the cable.

6. Reinstall 1065-0678, upper screen.
7. Reinstall monitor cover.
8. Power up system.
9. Check system operation for noise bands.
10. Complete service documentation indicating parts replaced.

ASSEMBLY INSTRUCTION – WRITTEN INSTRUCTION AID

REFER TO FIGURE 15 FOR COLOR LEFT CABLE INSTALLATION.

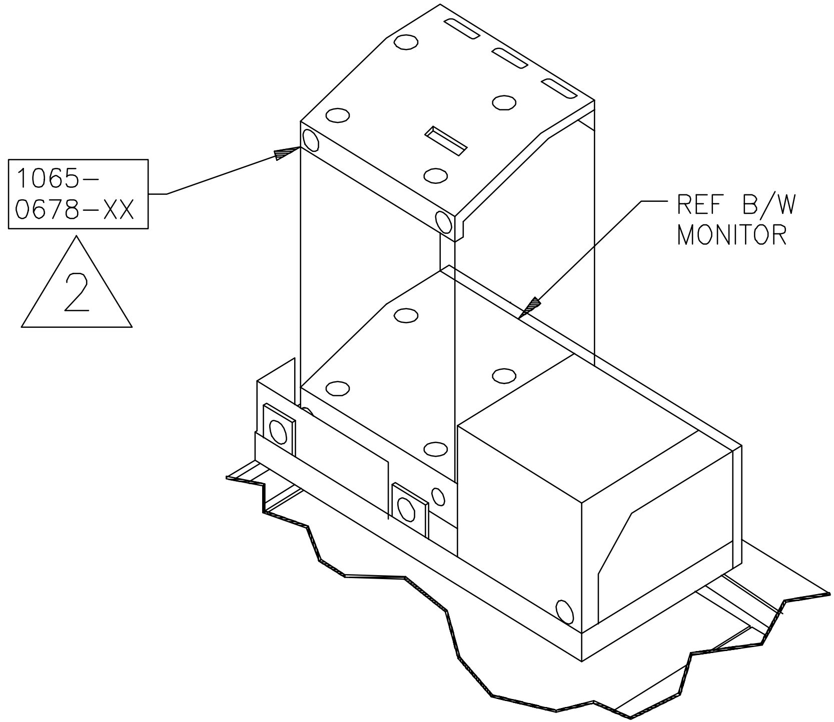
1. **INSURE POWER AND SIGNAL LINE FOR COLOR MONITOR ARE PLUGGED INTO THE BACK OF THE COLOR MONITOR AND CABLES ARE TUCKED INTO THE SLOT BETWEEN THE MONITOR AND THE MONITOR BASE.**

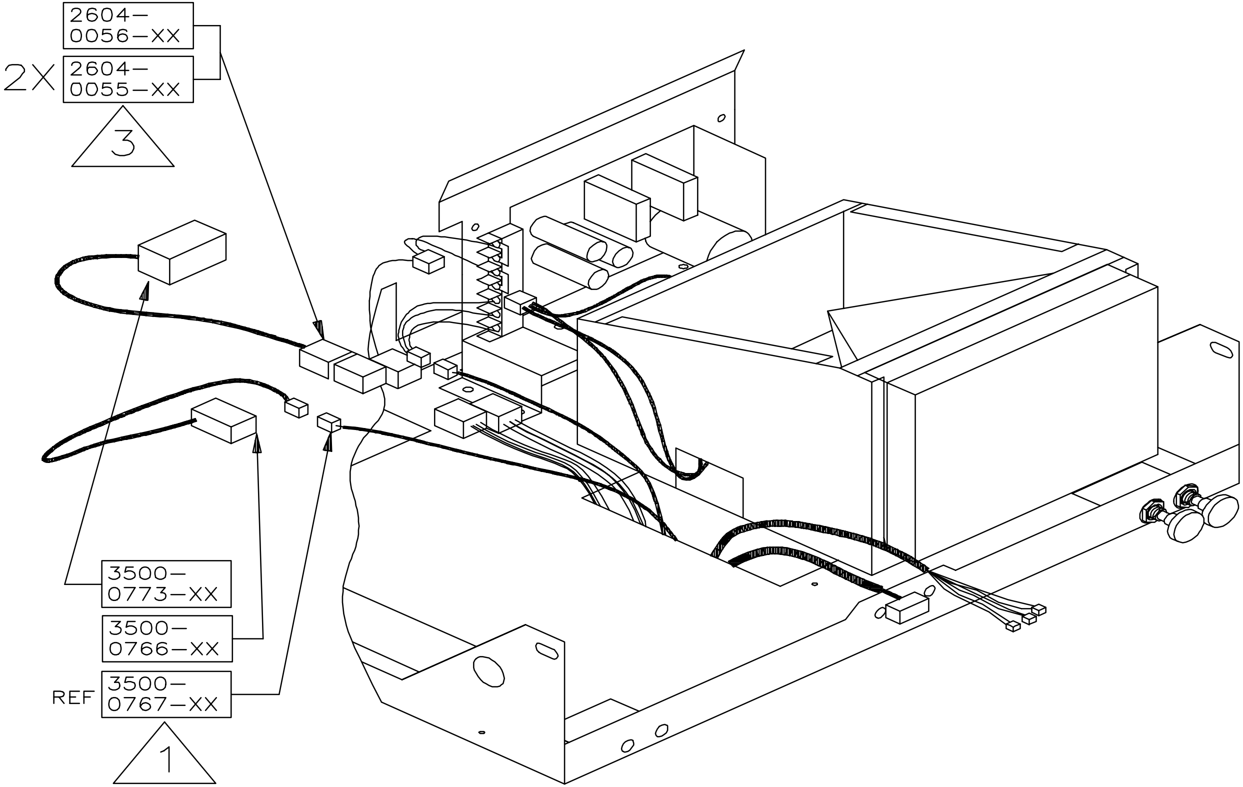
2. **PLACE UPPER SCREEN (1065-0678-XX) ON TOP OF BLACK AND WHITE MONITOR. DO <u>NOT</u> SECURE UPPER SCREEN AT THIS TIME, IT WILL BE SECURED AT BUTTON-UP.**

3. **INSURE 2 FERRITES ARE INSTALLED IN FERRITE SLEEVE CASE ON CABLE NEXT TO BROWN CONNECTOR WHERE SHOWN.**

ASSEMBLY INSTRUCTION – VISUAL INSTRUCTION AID

FIGURE 15
LEFT MONITOR REMOVED
FOR CLARITY





ADVANCED TECHNOLOGY LABORATORIES	DOCUMENT NO. 9040-0604	REV. C	SHEET 33

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	April 13, 1994	S.B. No.:	HDI–42	Rev:	
To:	All Field Service Personnel	C.O. No.:			
Author:	Jan Merkurieff				

Intermittent Doppler Noise (UM-9 HDI)

PROBLEM: During Steered CW operation, the background intermittently fills with noise in big fat bands as Doppler PRF is adjusted up or down. Noise runs parallel to the baseline. Changing PRF, wall filter, or baseline restores normal operation. Gain and output can be adjusted but have no effect and the fault condition does not change. Even at 0% gain, lots of background noise is displayed.

SCOPE: Advanced Digital Data Analyzer (ADDA) PCB.

EFFECTIVITY: On an as needed basis.

SOLUTION: Replace ADDA PCB.

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	April 14, 1994	S.B. No.:	HDI–43	Rev:
To:	All Field Service Personnel	C.O. No.:		
Author:	Laurence J. Simanek	C.A.R. No:	536	

Special Instruction for Insertion of all PCBs into UM-9 and HDI Card Cage

PROBLEM: Intermittent operation of system due to improper insertion of PCBs.

SCOPE: UM-9 and HDI Systems

EFFECTIVITY: Immediate

CAUSE: The proper mechanical fit of Circuit boards into the motherboard and the Channel board into the Scanhead Select PCB is critical to the functionality of the front end.

SOLUTION: Follow the insertion instructions for the following:

1 Insertion of all PCBs into and on the Card Cage.

2. Insertion of Channel boards.

3. Installation of the Scanhead Select module.

Instructions for the Insertion of PCBs Into and on the Card Cage

1. Insert the PCB into the card cage by sliding it along the bottom card rail until it makes contact with the Backplane connectors. Feel for the engagement of the connectors.

NOTE: *Due to tolerance build-up, it is sometimes necessary to lift the PCB up (approximately .030 - - .060 inches before engagement between the two connectors will take place. This technique is only to be used if, after the initial contact, the PCB will not insert.*

2. Insert the PCBs with even pressure on both top and bottom into the Backplane. Do not rock the PCB into place.

3. Visually inspect all PCBs to ensure they are fully seated into the Backplane, i.e., their back edges, both top and bottom, should be in line with one another.

Instructions for the Insertion of Channel Boards

1. Follow steps 1 and 2 above.

2. After proper insertion, visually inspect the alignment notch in all Channel boards. They must be in line with one another.

Use of a non-conductive straight edge inserted into the notches is one way of determining exact alignment.

Instructions for the Insertion the Scanhead Select Board

1. With the Channel boards parallel to each other, align the Scanhead Select Module to the Channel boards gold fingers and apply even pressure to partially seat the assembly. See Figure 1.

2. While the Scanhead Select and Channel boards are going together, check the alignment of the 9 pin connector on the right backside of the Scanhead Select. If necessary, remove the 7500-0636-XX PCB and install it after the Scanhead Select is fully tightened down.

NOTE: *It is very important that the Scanhead Select board is* ***not*** *rocked onto the Channel boards gold fingers.*

3. Insert the Scanhead Select board onto the Channel boards until the captive screws engage with the card cage pem nuts. Hand tighten the screws using the sequence detailed in Figure 2.

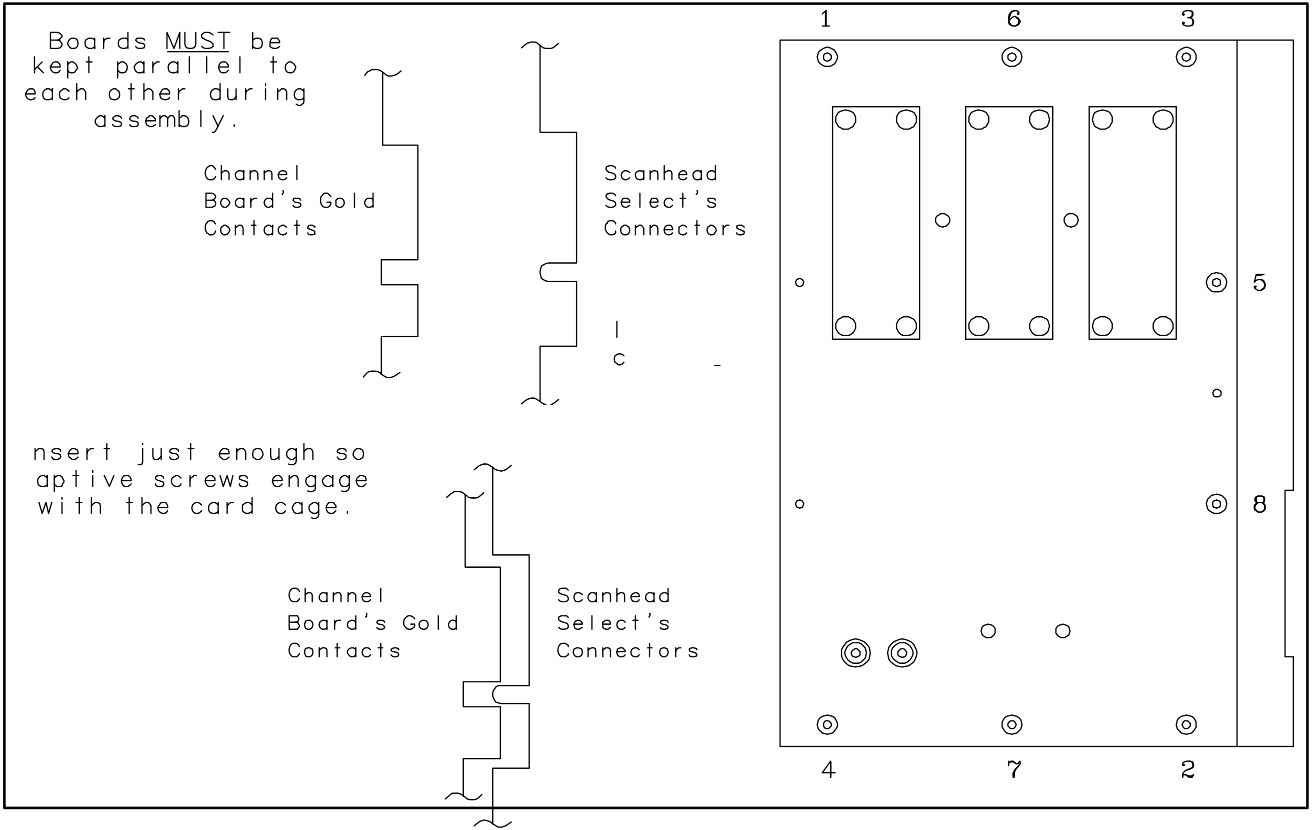
NOTE: *It is recommended to use a torque driver set to 6- -8 in/lbs and start the torque sequence detailed in Figure 2.*

4. Turn each captive screw $^1/_2$ to 1 turn maximum, before going on to the next screw in the sequence in Figure 2. Continue this until all screws are torqued to their proper amount.

5. When removing the Scanhead Select PCB, loosen the captive screws in the reverse numeric order $^1/_2$ to 1 turn maximum at a time.

6. Pull the assembly straight out to remove it from the card cage.

NOTE: *Do not rock the assembly away from the card cage.*



PCB Alignment

Figure 2. Torque Sequence

HDI–7–112

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	September 16, 1994	S.B. No.:	HDI–44	Rev:	A
To:	All Field Service Personnel	C.O. No.:			
Author:	Laurence J. Simanek	C.A.R.:	30		

UM-9/HDI Monitor Failures

This service bulletin supercedes S.B. HDI--44.

PROBLEM: Monitors returned to the factory as DOA at time of installation at a customer site.

1. Noisy brightness and contrast pots.

SCOPE: Color and B/W Monitors

EFFECTIVITY: Immediate

CAUSE: Failed monitors were incorrectly installed and returned to the factory DOA. The failures were caused during installation of the brightness and contrast potentiometers. Without firmly holding the pot in place during the torque sequence, the body can rotate, shearing the location/alignment tab and potentially causing the pot leads to short against the chassis, thus rendering the monitor inoperable.

NOTE: *Caution must be also be used to ensure the locating tab of the pot is inserted into the corresponding location hole notch on the chassis, or binding of the potentiometer shaft will result.*

2. The monitor brightness and contrast potentiometer location/alignment hole in the monitor base plate 1065-0630-01 does not have sufficient depth based on sheet metal thickness. The location/alignment tab of the monitor brightness and contrast pot therefore bottoms out, causing stress on the shaft assembly and possibly causing an ELF noisy or binding condition.

SOLUTION: Ensure the brightness and contrast potentiometers are aligned correctly and are not rotated during the torque sequence. Install an internal star washer (provided with pot assembly) on both sides of the monitor base plate if it does not have the location/alignment hole drilled completely through the sheet metal.

Refer to Figure 1 for B/W monitors and Figure 2 for color monitors.

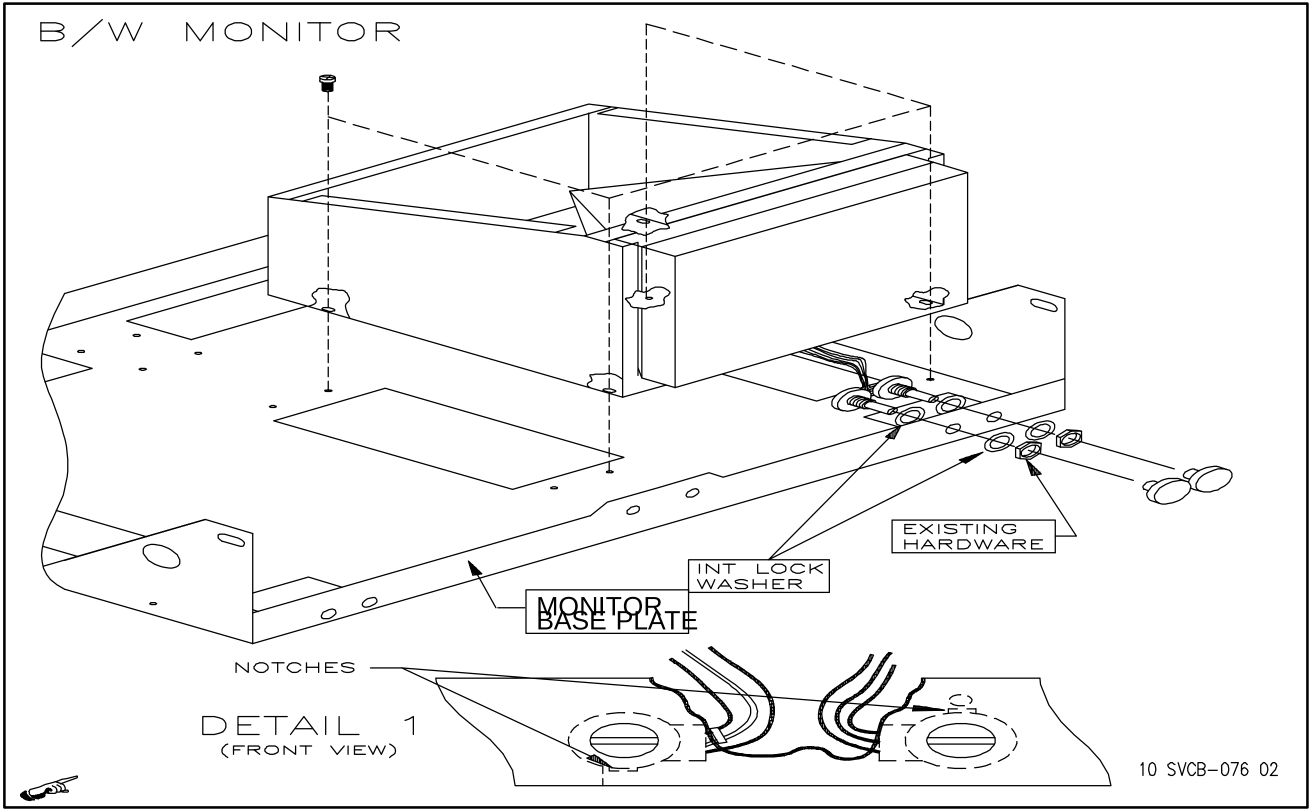

B/W MONITOR
EXISTING HARDWARE
INT LOCK WASHER
MONITOR BASE PLATE
NOTCHES
DETAIL 1
(FRONT VIEW)
10 SVCB-076 02

Figure 1

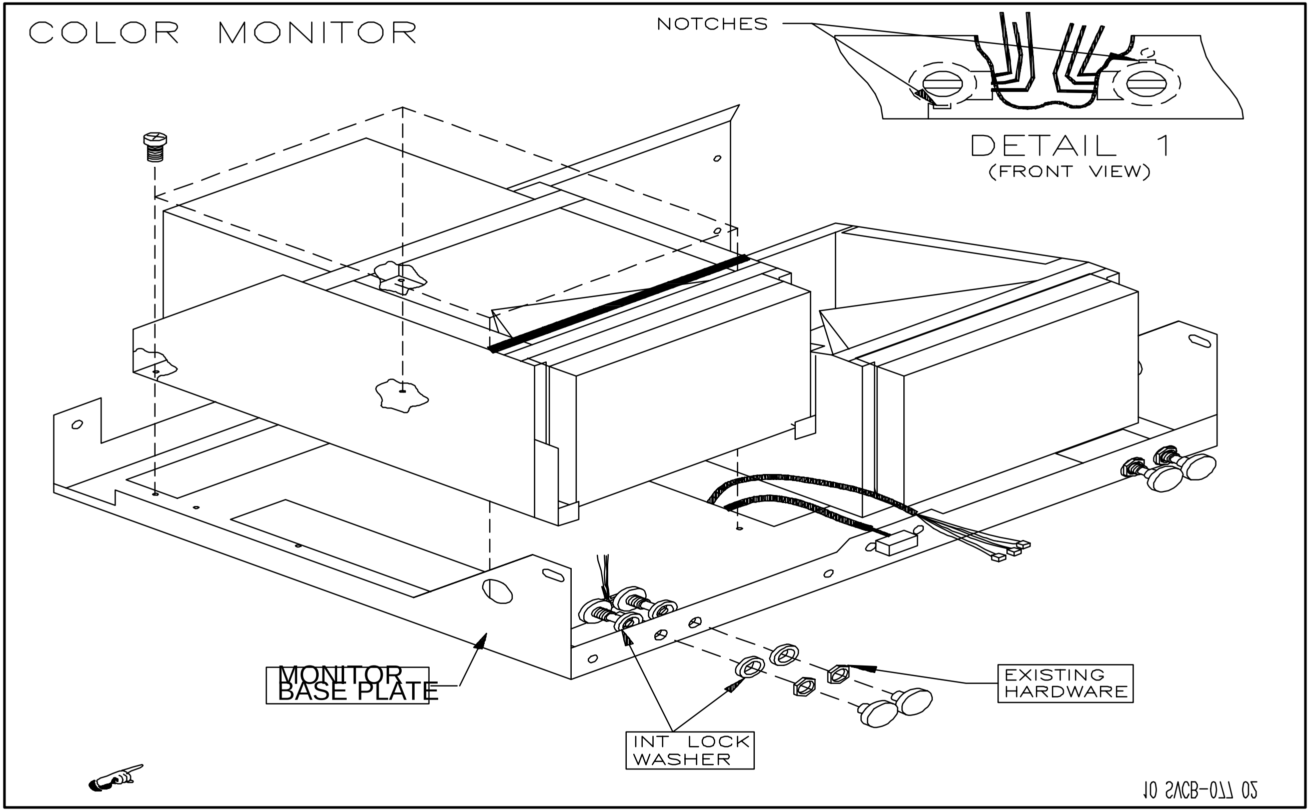

COLOR MONITOR
NOTCHES
DETAIL 1
(FRONT VIEW)
MONITOR BASE PLATE
EXISTING HARDWARE
INT LOCK WASHER

Figure 2

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	April 21, 1994	S.B. No.:	HDI–45	Rev:
To:	All Field Service Personnel	C.O. No.:		
Author:	Laurence J. Simanek	C.A.R. No.:	573	

UM-9 HDI Hard Drive Jumper Connections

PROBLEM: Potential boot-up problems caused by jumpers on the hard drive.

SCOPE: All 40, 42, 52 and 85 Meg Drives

EFFECTIVITY: Immediate. Supersedes Hot Tip, 7/14/93.

CAUSE: After loading software onto the hard drives, the factory left jumpers on the hard drive.

SOLUTION: Check the jumper positions prior to installing a new hard drive. There should be no jumpers in positions A0, A1, and A2. For 40 and 52 meg drives, see Figure 1 for jumper configuration. For 42 and 85 meg drives, see Figure 2.

This information is in Section 5A of the UM-9 HDI Field Service Manual.

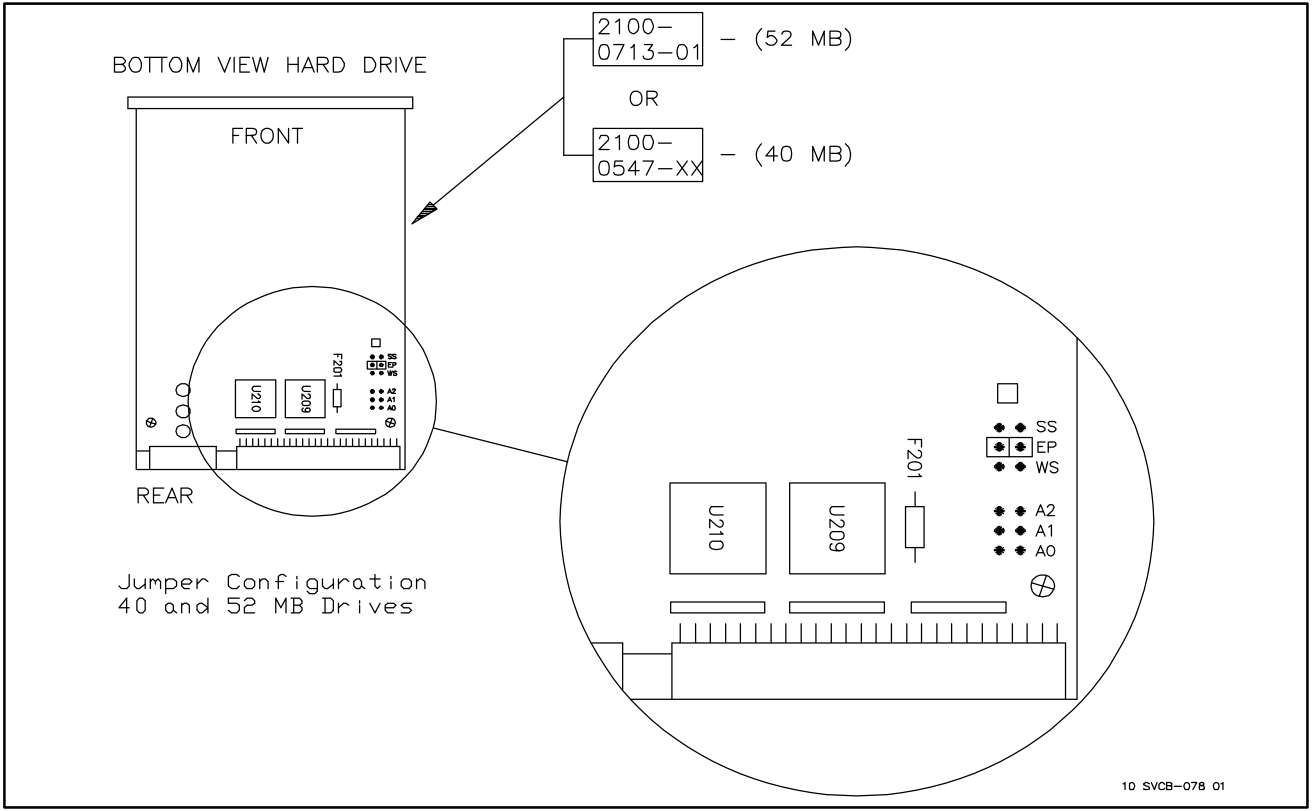

BOTTOM VIEW HARD DRIVE
FRONT
REAR
2100-0713-01 – (52 MB)
OR
2100-0547-XX – (40 MB)
F201
U210
U209
SS
EP
WS
A2
A1
A0
Jumper Configuration
40 and 52 MB Drives
10 SVCB-078 01

Figure 1

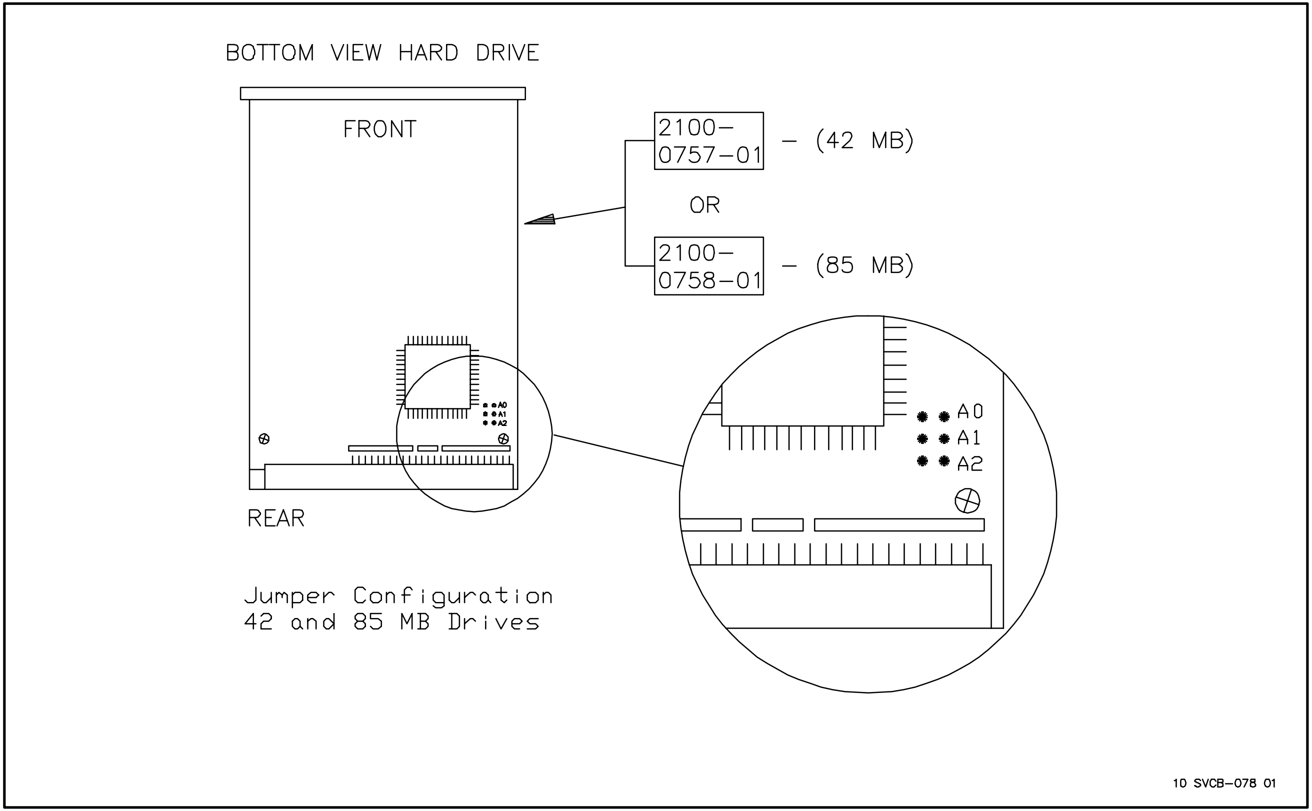

BOTTOM VIEW HARD DRIVE
FRONT
REAR
2100–0757–01
– (42 MB)
OR
2100–0758–01
– (85 MB)
A0
A1
A2
Jumper Configuration
42 and 85 MB Drives
10 SVCB–078 01

Figure 2

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	April 26, 1994	S.B. No.:	HDI–46	Rev:
To:	All Field Service Personnel	C.O. No.:	100118	
Author:	Jan Merkurieff	C.A.R.:		

UM-9 HDI Scanhead Holder on DAASR and Non DAASR Modules

PROBLEM: The Scanhead Holder (1065-2103-03) has a noisy rattle and loose feel when force is applied by hand to move the system.

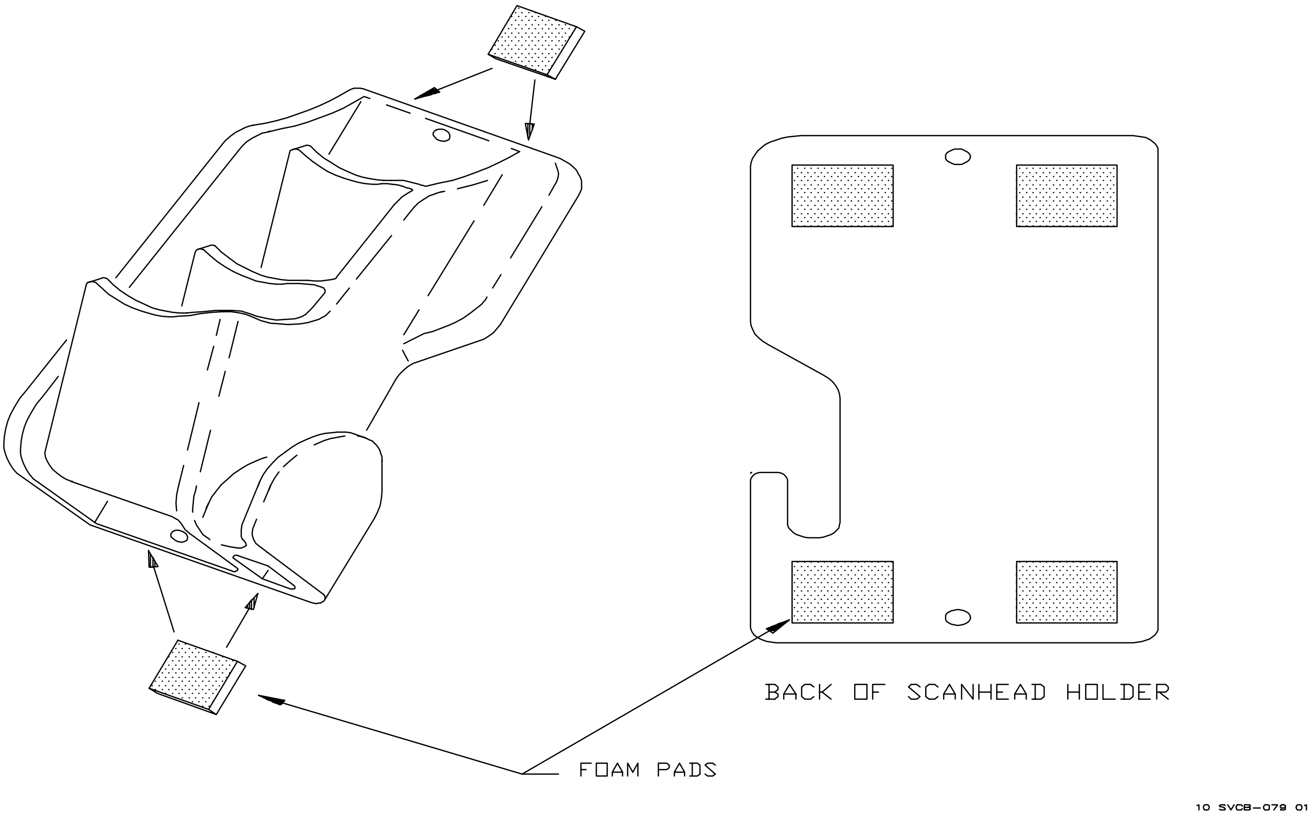
SCOPE: Systems installed prior to April 15, 1994. New systems will have this corrected in them.

EFFECTIVITY: Immediate

CAUSE: Loose fit between Scanhead Holder and Frame.

SOLUTION: Install foam pads (existing ATL parts, 1065-1646-01, 0.5”) in four places on the rear of the Scanhead Holder.

See the following figure.



Placement of Foam Pdas on Scanhead Holder

WITH ATTACHMENTS: YES ■ NO □
WITH PARTS: YES □ NO ■

Service Bulletin

Date:	April 21, 1994	S.B. No.:	HDI-47	Rev:
To:	International Service Personnel	C.O. No.:		
Author:	Laurence J. Simanek	C.A.R.:	756	

Undersized Power Cord on 220V–240V International UM-9 or HDI Systems

PROBLEM: The power cord P/N 2275-0159 that is used in the cable assembly P/N 111-24280-02 is the wrong size.

The cable assembly P/N 111-24280-02 is made up from the following:

- 2275-0159 Cable Assy., 3C, Pwr. -- 1.5w
- 3100-0952 Conn., Pwr. Plug, 250V
- 3100-1248 Term., Ring, #6, 16--14AW (Qty 3)

SCOPE: All International systems on attached list shipped between March 10 and April 15.

EFFECTIVITY: At installation or next call.

CAUSE: The vendor shipped two different versions of the power cable to ATL.

The following two problems may result:

- The defective power cord wire is 18 gauge (0.75 mm^2) and should be 14 gauge (1.5 mm^2). This could, under an over-current condition, cause damage to or failure of the power cord. The UM-9 and HDI systems can consume up to 7.4 amps worst case for a limited time. The smaller cord is rated for 6.0 amps continuous load.
- Also, the smaller cord, when used with the Otto Heil female receptacle (P/N 3100-0952) installed on the end of the cable, could cause a failure of the strain relief in this receptacle because there is not enough compression to grab the smaller cord.

Without proper strain relief to the cord, excessive force could be applied directly to the terminals and cause the wires to pull loose.

SOLUTION:

1 Systems on the attached lists must be inspected at the time of install or next available call to determine if an incorrect power cord was shipped with a UM-9 or HDI system.

Option: Replace the cord.

2. Measure the diameter of the cord.

The correct diameter is:	8.3 mm (0.32 inch)
The incorrect diameter is:	6.7 mm (0.26 inch)

3. Replace the undersized or defective cords with a new cord. The power cord could be purchased locally if it meets the same specification as that used by Bothell. Otherwise, order the cord directly from Bothell.

4. Return the defective cords to Bothell with correct documentation identifying the defect.

5. A temporary solution, to be used only until the cord can be replaced, is to reverse the strain relief clamp in the Otto Heil female receptacle, making sure this clamp compresses down on the power cord. This temporary fix will assist in maintaining a better strain relief until a replacement is installed.

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

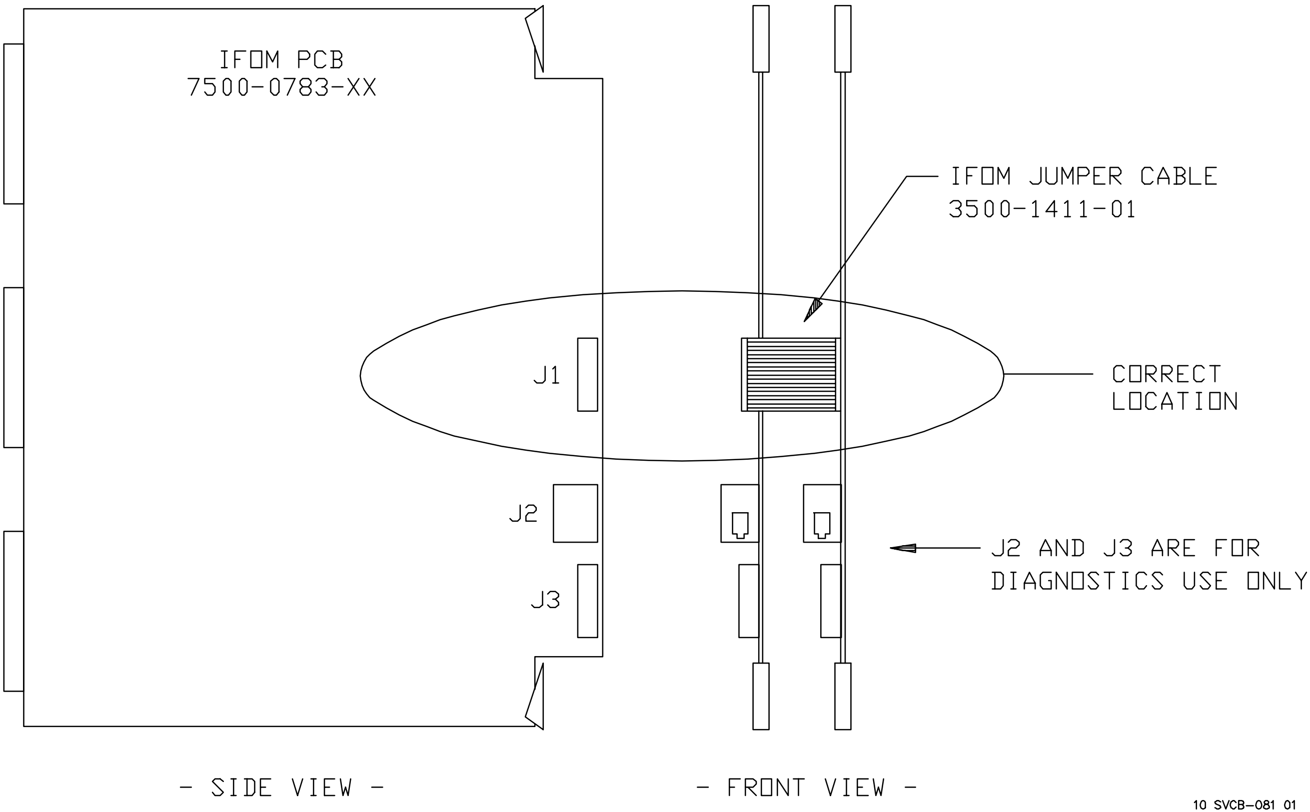
Date:	May 12, 1994	S.B. No.:	HDI–48 Rev:
To:	All Field Service Personnel	C.O. No.:	
Author:	Robert Olver	C.A.R.:	

Proper Installation of IFOM Jumper Cable on UM-9 HDI Systems with the ESP Option

PROBLEM: System looses all data from the Slave IFOM. Images appear as if the HDI system is a Non-ESP system.

CAUSE: The ribbon cable that connects the two IFOM PCBs has been incorrectly installed at the J3 location

SOLUTION: Using the figure below, verify the ribbon cable is properly installed from J1 of the Master IFOM to J1 of the Slave IFOM.



Correct Location of IFOM Jumper Cable

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	May 18, 1994	S.B. No.:	HDI–49	Rev:
To:	All Field Service Personnel	C.O. No.:		
Author:	Noel Joseph	C.A.R.:		

Artifacts in Cystic Masses

PROBLEM: An artifact appears in cysts when multiple focal zones are used. See Figure 1.

SCOPE: All UM-9 HDI systems.

EFFECTIVITY: Immediately

CAUSE: Received energy from a previous transmit cycle is superimposed on displayed image. Commonly known as reverberation.

SOLUTION: Toggle the Frame Rate key. If the artifact is still present, move or reduce the number of focal zones.

This figure is electronically unavailable.

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	August 23, 1994	S.B. No.:	HDI–50	Rev:
To:	All Field Service Personnel	C.O. No.:	100312A	
Author:	Stan Trussell	C.A.R.:	815	

Intermittent Boot Up of the UM-9 HDI System

PROBLEM: The system will intermittently not boot up completely.

SCOPE: 80386SX CPU PCBs, part numbers 7500-0749-01 and 7500-0573-09.

EFFECTIVITY: Upon failure.

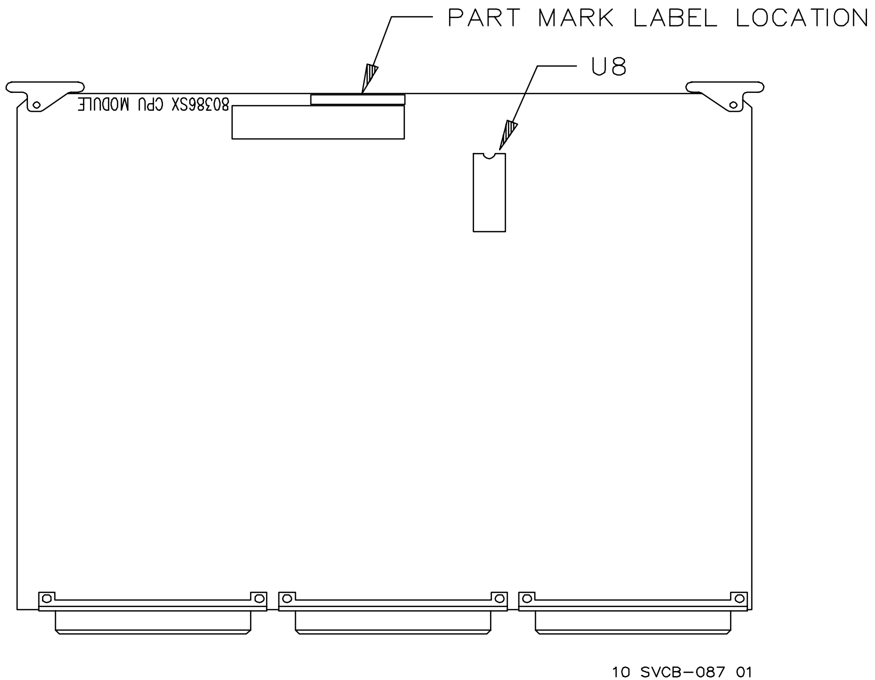
CAUSE: A new device, “Micro Linear” ML2258 BIP 8 bit A/D converter has been installed at U83. The output enable signal is the wrong polarity and causes bus contention problems. This problem exists with older A/D converters but was

never apparent. Requests to the interrupt controller, U26, are being corrupted due to the new A/D device driving the bus during this time. The source of the enable signal is a programmable device, U8, part number 4201-0992-02.

SOLUTION: Replace I.C. U8 with part number 4201-0992-03. Part mark the PCB as follows (see figure below):

For 7500-0749-01, mark as -02 using label 4100-0629-01.
For 7500-0573-09, mark as -10 using label 4100-0629-01.

The equation for the output enable signal was changed to the proper assertion level, eliminating the bus contention problems with the “Micro Linear” device.


PART MARK LABEL LOCATION
U8
80386SX CPU MODULE
10 SVCB-087 01

WITH ATTACHMENTS: YES ■ NO □
WITH PARTS: YES □ NO ■

Service Bulletin

Date:	September 22, 1994	S.B. No.:	HDI–51	Rev:
To:	All Field Service Personnel	C.O. No.:		
Author:	Laurence Simanek	C.A.R.:		

Registration Accuracy Checks for UM-9 HDI Systems

PROBLEM: Measurement errors occurring after repair, upgrade, and QAA.

CAUSE: Registration accuracy is not being checked consistently when PCBs are replaced, firmware is replaced, software is changed, or general maintenance of the system is performed.

EFFECTIVITY: Immediate

SOLUTION: Whenever a critical PCB, scanhead, or monitor is replaced, check the registration accuracy using the procedure in paragraph 2C--5.4 of the service manual. Also refer to Table 2C--1 of Manual Change 4725-0013-18 (attached).

WITH ATTACHMENTS: YES ■ NO □
WITH PARTS: YES □ NO ■

Service Bulletin

Date:	December 5, 1994	S.B. No.:	HDI–52	Rev:
To:	All Field Service Personnel	C.O. No.:		
Author:	Robert Olver	C.A.R.:		

UM-9 HDI CPA Issues

PROBLEM: CPA does not appear to function.

CAUSE #1: The CPA Color Maps are being overwritten with the customer's user-defined color maps (Map A--D) during an upgrade. Use of the specialized CPA color maps provided by ATL is highly recommended for optimal operation of CPA.

SOLUTION #1: The CPA maps must be manually created and saved using the "CREATE MAPS" function. Because the HDI system allows only 4 user-defined color maps, it will be necessary for the customer to choose between their own color maps and the CPA

maps. Refer to Step 10 and Step 11 of Attachment A for instructions on creating the CPA Maps.

CAUSE #2: Not all of the customer's user-defined presets are being modified for the CPA setups.

SOLUTION #2: All of the customer's user-defined presets, including those in the RADIO SETUPS, CARDIO SETUPS, VASCULAR SETUPS, and OB/GYN SETUPS must be modified to add CPA setup information. Refer to Attachment A for instructions on modifying user presets.

CAUSE #3: Sales Representatives, Application Specialists, and some customers may have user-defined presets stored on floppy disks that have not been modified for CPA.

SOLUTION #3: For each user-defined preset stored on floppy disk, it is necessary to retrieve those setups into the HDI system and modify them for CPA. Refer to Attachment A for detailed instructions on modifying existing user-defined presets for CPA.

CAUSE #4: If the system is configured for the "OBS" Medical Specialty in the Software Configuration Tables, the CPA maps will not be loaded in the system.

SOLUTION #4: The CPA maps must be manually created and saved using the "CREATE MAPS" function. Refer to Step 10 and Step 11 of Attachment A for instructions on creating the CPA Maps.

ATTACHMENT A
MODIFYING USER PRESETS FOR CPA

1 If the customer has created their own user-defined presets, it will be necessary to modify each of those presets for the CPA feature to operate correctly. If the customer is using only ATL factory defaults, skip to Step 10.

2 Go into Color Mode.

3 Press the "SETUP" button. Select one of the user-defined presets to modify using the "RECALL" presets menu that appears on the system monitor. Write down the name of the preset being modified, it will have to be re-entered in Step 7.

NOTE: *DPI Presets created in 13X, 14X, or 15X software should not be used for CPA operation. It is recommended to save another preset over the DPI preset location.*

4 Press the "RETURN" key to exit of the "SETUP PANEL". Enable the CPA mode by pressing the "CPA ON/OFF" key on the "COLOR DOPPLER CONTROLS" panel. The word "CPA" will appear on the monitor when CPA mode is active.

5 Press the "SETUP" button. Press the "CHANGE SETUPS" key. You will see a new key labeled "CPA SETUPS". Press the "CPA SETUPS" key. For the user-defined preset being modified, enter the most appropriate set of CPA values from the table below. The most appropriate values are determined by the type of exam that the customer is using for that user-defined preset (i.e. Rad, Card). You may need to consult with the customer to determine the exam type of their user-defined presets.

	Rad	Card	Vasc Art	Vasc Vein	OB
MAP 1–8, A–D	A	A	A	A	A

MAP NORM/INVERT	NORM	NORM	NORM	NORM	NORM
COLOR SENSITIVITY	12	12	12	12	12
VELOCITY RANGE	800 HZ	800 HZ	1200 HZ	800 HZ	1000 HZ
WALL FILTER	50 HZ	50 HZ	100 HZ	50 HZ	100 HZ
FRAME RATE	HRES	HRES	HRES	HRES	HRES
COLOR GAIN	85	85	85	85	85
COLOR VS ECHO WRITE PRIORITY	MAXIMUM	MAXIMUM	MAXIMUM	MAXIMUM	MAXIMUM
PERSISTENCE LEVEL	5	5	5	5	5
DYNAMIC MOTION DIFF	OFF	OFF	OFF	OFF	OFF
DYNAMIC MOTION DIFF LEVEL	3–LIVER	2–RAD/OB	5–CAROTID	7–VASC	2–RAD/OB
CPA BACKGROUND ON/OFF	ON	ON	ON	ON	ON

NOTE: *If the customer desires that the preset comes up in CPA mode, skip to Step 7.*

6 Exit the “SETUP PANEL”. On the “COLOR DOPPLER CONTROLS” panel, press the “CPA ON/OFF” key to exit out of CPA mode.

7 Press the “SETUP” button. Press the “SAVE PRESETS” key., On the keyboard, enter the preset name that was recorded in Step 3. Press the “SET” button to save the modified preset.

8 Repeat Steps 3 through Step 7 for each user-defined preset established by the customer. Verify that all four categories of user-defined presets, RADIO, CARDIO, VASCULAR, and OB/GYN have been modified.

9 On the “SETUP PANEL” press the “STORE SETUPS” key to save the modified presets to the hard drive. If the customer has their user presets stored on a floppy disk, insert that floppy disk into the floppy drive and press the “STORE SETUPS” key again to save the modified presets to the floppy disk.

10 Verify or create the following CPA Color Maps using the ”Create Maps” selection on the ”COLOR MAPS” touch panel. Save the maps as Map A and Map C.

MAP A				MAP C		
Velocity				Velocity		
RED	GRN	BLU		RED	GRN	BLU
255	226	131		255	221	41
147	58	65		136	29	15
13	5	30		12	7	4
43	0	95		0	0	0
115	41	65		105	105	105
255	140	13		236	255	250
Curvature					Curvature	
POS	NEG				POS	NEG
10	13				8	10

NOTE: *To change the Variance values, go to the "COLOR PROCESS" panel and press the "VARIANCE ON/OFF" key to turn variance on, then return to the "CREATE MAPS" panel to finish creating the maps. Variance is typically not used when in CPA Mode but the maps are set up with variance values for consistency.*

Variance				Variance		
RED	GRN	BLU		RED	GRN	BLU
0	255	0		0	255	0
0	136	0		136	0	0
0	16	0		0	0	0
0	16	0		0	0	0
0	136	0		0	0	136
0	255	0		0	255	0

NOTE: *When in CPA Mode, only the bottom half of the color bar is being used. To use the top half of the color bar use the "INVERT COLORS" key on the "COLOR DOPPLER CONTROLS" panel.*

Map A – Map A is recommended for most applications.

Map C – The top half of Map C is recommended when the customer desires a more "Contrasty" presentation of flow. The bottom half of Map C would primarily be used when printing CPA images to a Black and White printer or Multi-Image Camera.

11 The HDI system allows only 4 user-defined color maps, Maps A, B, C, and D. If the customer has been using their own custom Color Maps, it will be necessary for them to choose between their own color maps and the

CPA maps. For optimal operation of the CPA feature, use of the Color Maps installed in Step 10 is highly recommended. If the customer chooses to save the CPA Maps in a location other than MAP A and C, it will be necessary to re-modify the CPA Presets modified in Step 3 through Step 7 to select the correct map location.

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	December 19, 1994	S.B. No.:	HDI–53	Rev:
To:	All Field Service Personnel	C.O. No.:	100554	
Author:	Laurence J. Simanek	C.A.R.:	704	

UM-9 HDI Channel Board Configurations

PROBLEM: Identification of preferred UM-9 HDI Channel Board configurations.

SCOPE:
7500-0544-xx Channel PCBs
7500-0755-02 Channel PCBs
7500-0772-03 Saiph Channel PCBs
7500-0772-04 Channel PCBs

EFFECTIVITY: Immediately

CAUSE: Differences in system performance due to system configurations and system options.

SOLUTION: Table 1 identifies preferred configurations that are supported in the field. The CSR should attempt to make type for type exchanges. This service bulletin will supersede the service manual until a manual change has been completed.

Table 1. UM-9 HDI Channel PCB Compatibility

Product Option	PCB Configuration	Acceptable Qty	Comments
HDI Non-ESP, Non-Steered	7500-0544-XX or 7500-07XX-XX	8 8	None None
HDI ESP, Non-Steered	7500-0544-XX or 7500-07XX-XX or Combination of (-0544 & -07XX) PCBs	8 8 4 by 4 – Note 3	None None Channel PCBs are interleaved
HDI with Steered CW	7500-0755-02 or 7500-0772-04	8	Note 4
HDI ESP with Steered CW	7500-0755-02 or 7500-0772-04	8	Note 4

1. Do not mix and match Channel PCBs except as indicated in the table above.

2. All PCBs should be replaced ‘Type for Type’ except as indicated in Note 3 below.

3. When Channel PCBs are interleaved, the configuration is as follows:

   - Slots A22, 24, 26, 28 will hold the -0544 PCBs
   - Slots A23, 25, 27, 29 will hold the -07XX PCBs

4. If a customer complains about image quality issues on an HDI system with steered CW, determine the type of Channel Board used in the system. Modify the system to the preferred configuration per the table above.

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	March 3, 1995	S.B. No.:	HDI–54	Rev:
To:	All Field Service Personnel	C.O. No.:		
Author:	Dean Fink	C.A.R.:		

Incorrect Replacement Codes for UM-9 HDI Scanhead Select PCB

PROBLEM: The lack of replacement codes for the 7500-0629-04 and -05 Scanhead Select PCBs in UM-9 HDI Field Service Manual (4720-0013-03) has caused a shortage of the 7500-0629-06 Scanhead Select PCB. The -04 and -05 PCBs that are returned to Bothell cannot be reworked to a -06 PCB.

CAUSE: Incorrect documentation.

EFFECTIVITY: All UM-9 HDI software versions.

SOLUTION: The incorrect replacement codes will be corrected when the information in this service bulletin is incorporated in field service manual change 4725-0013-21 (release date April 95). Until then use this service bulletin for reference.

All Scanhead Select PCBs should be replaced on a “Like for Like” basis. Use the following table for the correct replacement codes until the service manual change is released. The italicized replacement codes indicate the changes from the codes listed in the field service manual. There was also a note deleted in the Feature Compatibility column regarding the compatibility of the -06 with the -04.

7500-0269		Replacement Levels					Features		Notes
Part No.		**10.43B**	**10.44A**	**10.43C and up[1]**					
Scanhead Select	04	L	L	L					Not for Biplane TEE
	05	L	L	L					Not for Biplane TEE
	06	L	L	L					Biplane TEE compat.

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	March 27, 1995	S.B. No.:	HDI–55	Rev:
To:	All Field Service Personnel	C.O. No.:		
Author:	Laurence J. Simanek	C.A.R.:	1081	

UM-9 HDI Systems Failing to Recognize Scanheads

PROBLEM: UM-9 HDI systems do not recognize scanheads and display error messages pointing to the FEC, Pulser Power Supply, and various Channel PCBs.

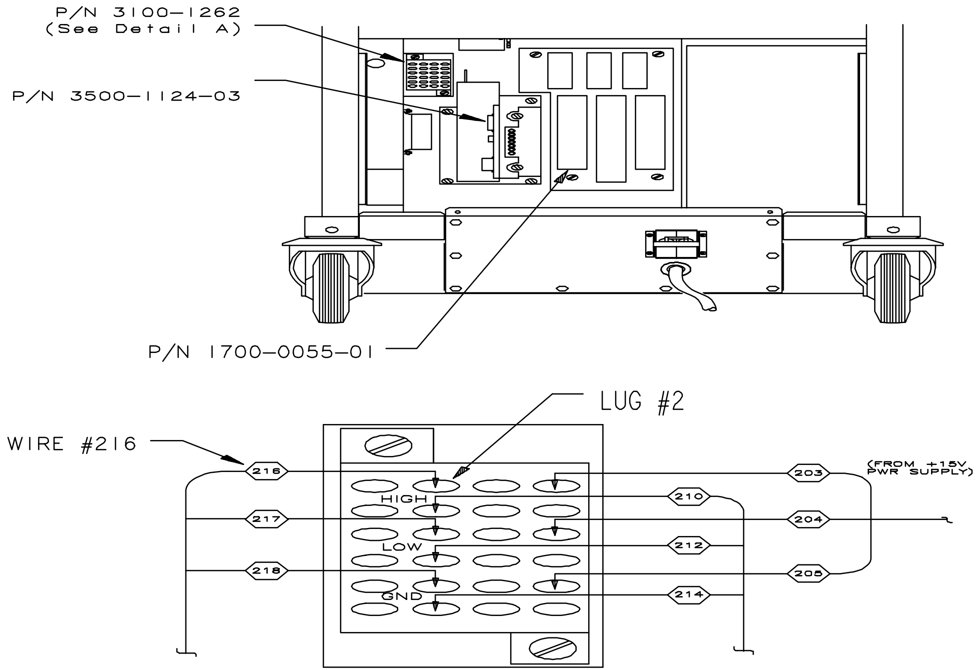
SCOPE: All UM-9 HDI systems.

CAUSE: The root cause for the error messages and inability to identify scanheads is the cable assembly, Pulser P.S., AC Input (P/N 3500-1124-03). Wire #216 to the 15 volt Power Supply (P/N 1700-0055-01) is not seated on the HIGH lug #2 of the terminal block (P/N 3100-1262). Refer to Figure 1.

EFFECTIVITY: Immediate

SOLUTION: Fully seat Wire #216 in terminal block HIGH lug #2.

CAUTION: *Live power, turn system off.*



TERMINAL BLOCK (P/N 3100-1262)
— DETAIL A —

10 SVCB-090 01

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	April 3, 1995	S.B. No.:	HDI–56	Rev:
To:	All Field Service Personnel	C.O. No.:		
Author:	Stan Trussell	C.A.R.:		

Mobile Casters for UM-9 and UM-9 HDI Systems

PROBLEM: High-use mobile accounts are complaining of caster failure.

SCOPE: UM-9 Phase 1, UM-9 Phase 2 and UM-9 HDI.

CAUSE: Stress on the weld point is causing the stem to break.

SOLUTION: Replace as needed with new non-welded version, recommended to be replaced in pairs. For the front order part number 2950-0711-01 (swivel lock), for the rear order part number 2950-0712-01 (total lock).

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	December 27, 1995	S.B. No.:	HDI–57 Rev: A
To:	All Field Service Personnel	C.O. No.:	
Author:	Noel Joseph	C.A.R.:	

Reliability of DC to DC Power Supply (UM-9 HDI Systems)

PROBLEM: Failure analysis has indicated a reliability problem with an obsolete DC to DC Power Supply, P/N 1700-0075-00.

SCOPE: This part was used on UM-8, UM-9 and UM-9 HDI Control Panel Interface PCBs.

EFFECTIVITY: Next call or QAA for warranty, Sound Care and Shared Care systems. At their discretion, domestic billable customers may have the DC to DC Power Supply replaced at the current Time and Materials list prices.

SOLUTION: Inspect the DC to DC Power Supply and replace if necessary.

REQUIRED TOOLS:

CSR Tool Kit

Weller Three-wire Soldering Iron, 25 watts* (issued in CSR Tool Kit)

Soldapult* (issued in CSR Tool Kit)

Solder

*If you do not have these tools you must purchase them locally.

REQUIRED PARTS: Power Supply, DC to DC, 12V to 155V, 75mA, P/N 1700-0075-01

PROCEDURE:

1 Gain access to the Control Interface PCB.

2 Inspect the DC to DC Power Supply. If PS1 is silver, you do not have to replace it. If it is black, proceed to step 3.

NOTE: *Label all cables and locations before disconnecting.*

3. Remove the Control Panel Assembly from the System.

4. Remove the seven screws securing the Control Interface PCB, P/N 7500-0689-XX or 7500-0528-XX. See figure.

5. Desolder the four pins on PS1.

CAUTION: *Do not use solder wick to desolder.*

6. Solder the replacement DC to DC Power Supply.
7. Reassemble the Control Panel Assembly.
8. Install the Control Panel Assembly.
9. Verify that all connections are correct. To verify cabling, refer to the UM-9 HDI Service Manual, P/N 4720-0013-03, page HDI--01C--1. The cabling diagram is also available in the Foldout Supplement P/N 4727-0013-XX.
10. Reassemble the System and verify that it is operating correctly.

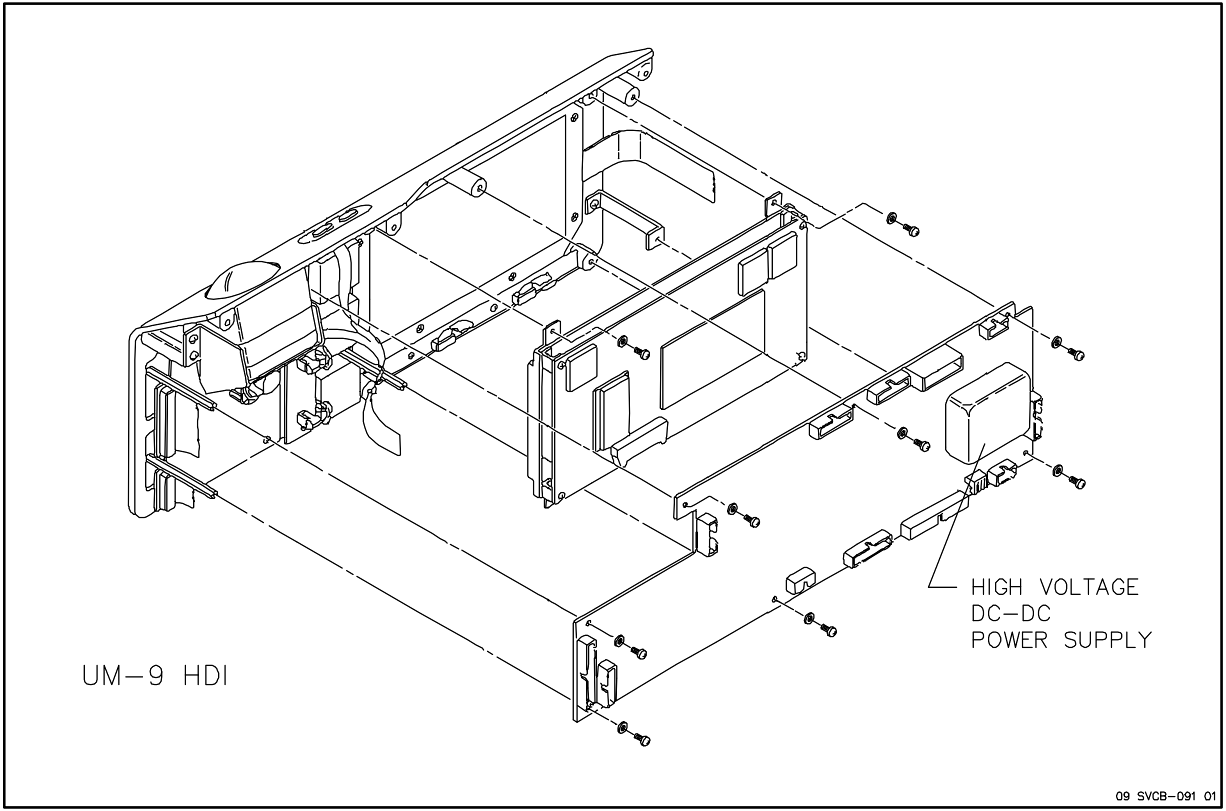


Figure 1

WITH ATTACHMENTS: YES ☐ NO ■
WITH PARTS: YES ☐ NO ■

Service Bulletin

Date:	April 1, 1996	S.B. No.:	HDI–58	Rev:
To:	All U.S. Field Service Personnel	C.O. No.:		
Author:	Jerry Norimatsu	C.A.R.:		

Release of UM–9HDI Diagnostic Software

OVERVIEW: This bulletin documents the release for distribution of the laptop diagnostic software for the UM–9 HDI system. The software is to be down–loaded from Corporate E–mail and used on the Customer Service issued laptop computers. The software can be used to check operation of each PCB individually or system operations as a whole.

TABLE OF CONTENTS:

REFERENCES: The following documents are referenced in this service bulletin:

Part Number	Description
4700–0256–xx	Field Computer Applications Guide
4720–0013–03	UM–9 HDI Field Service Manual
9050–0122	Customer Service Policy and Procedure
9050–0108	UM–9 HDI Channel Scanhead Power Splitter Test Procedure

EQUIPMENT REQUIRED: In addition to a boot–able UM–9 HDI system, the following equipment is required to perform these procedures:

Part Number	Description
2275–0331–01	9 pin to 25 pin Null Modem cable assembly
4252–0550–02	HDI Save/Recall disk
4500–1618–01	UM–9 HDI 128 Channel Power Splitter
no part number	Compaq Lite Laptop Computer Diagnostic Software
9063–0118-01	Diagnostic Service Software

NOTE: *The Null Modem cable assembly may be ordered through service stock. The Scanhead Power Splitter will be issued 1 per Customer Service Representative.*

1.0 INITIAL SETUP:

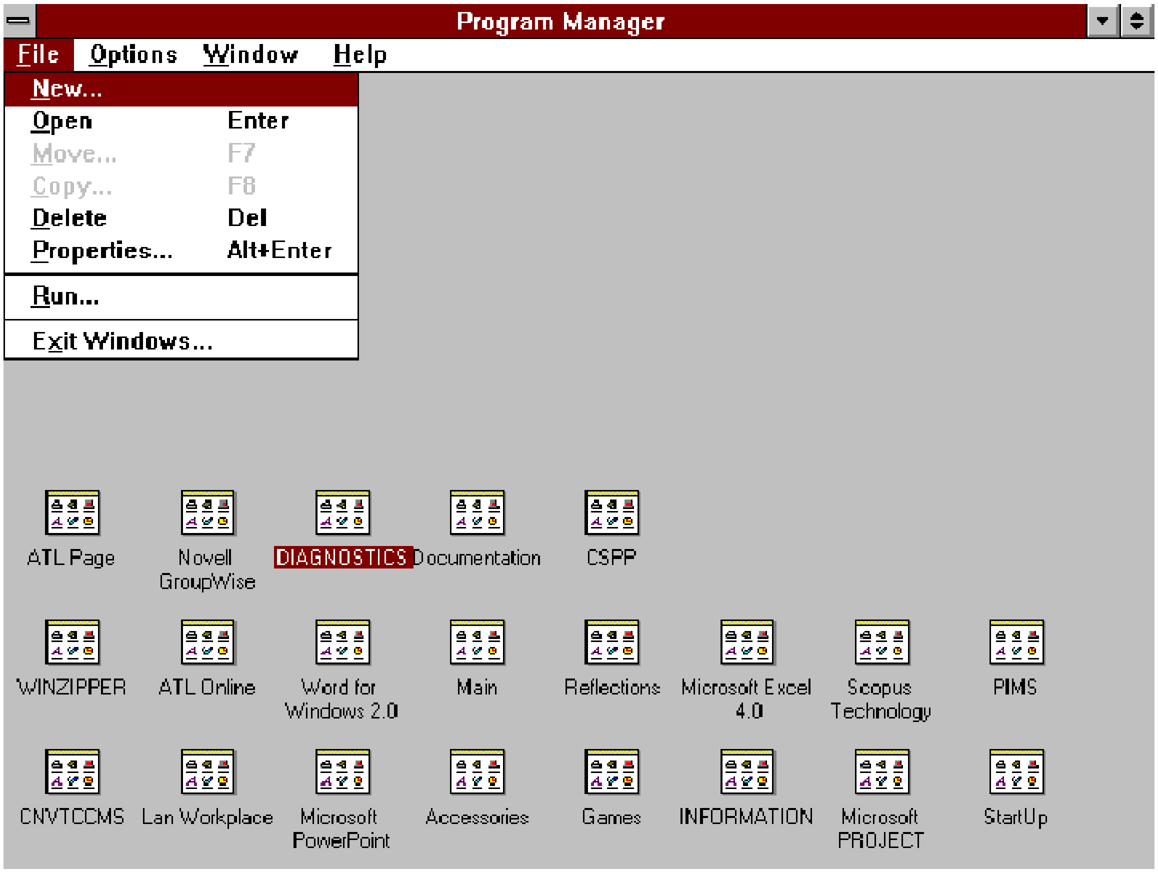
1.1 Remote Download of the Diagnostic Software Using Corporate E–Mail:

The current process for sending the diagnostic applications is via Corporate E–mail. ATL current E–mail process is "GroupWise". An installation program will be downloaded via Corporate E–mail and automatically installed onto the "C" drive of the laptop of the computer. The executable software will be downloaded as a separate file. The executable program and the installed directory must match in order to run the program.

Contact the "Customer Service" department for more details.

1.2 Creating a Group Item and a Program Item:

These steps assumes the "DIAG" directory and application files under the directory have been set up.



PROGRAM GROUP

1. Go to the “Program Manager” and click on “file”.
2. Click on “New”.
3. Click on “ Program Group” and “OK”.
4. Enter the words “DIAGNOSTICS” in the “Description” box and click on “OK”.

This will create a program group icon titled “DIAGNOSTICS”. See the above figure.

EXTENDED DIAGNOSTICS ICON:

1. Click on “File”
2. Click on “NEW”
3. Click on “Program Item” and OK.
4. In the “Description” dialog box type in EXT DIAG HDI.
5. Go to the “Command line” and click on browse.
6. Select the “C” drive under Drives.
7. Select All files under “List Files of Type.
8. Find the file name extdiag.exe and enter under the “File Name” box and click on OK.
9. Under the “Program Item Properties” select Change Icon and find an Icon under current Icon, click on “OK”.
10. Click on “OK “.

This will create a program Icon called EXT DIAG HDI.

FRONTEND DIAGNOSTICS ICON:

1. Click on “File”.
2. Click on “NEW”.
3. Click on “Program Item” and OK.
4. In the “Description” dialog box, type in FRONTEND DIAG HDI.
5. Go to the “Command line” and click on browse.
6. Select the “C” drive under Drives.
7. Select All files under “List Files of Type.
8. Find the file name FEDIAG.EXE and enter under the “File Name” box and click on “OK”.
9. Under the “Program Item Properties” select Change Icon and find a Icon under current Icon, click on “OK”.
10. Click on “OK”.

This will create a program Icon called FRONTEND DIAG HDI.

2.0 EXTENDED DIAGNOSTICS:

2.1 Hardware Setup:

1. Locate the J19 RS232 port on the rear of the HDI system and the 9 pin Com port connector located on the back of the laptop computer.
2. Connect the cable assembly (part number 2275–0331–01) to J19 and the 9 pin connector to the laptop computer.
3. Power up the HDI system.

2.2 Software Setup:

1. Under “Program Manager” find the “DIAGNOSTIC” program group and double click.
2. Find the program item icon “EXTDIAG HDI” and double click. The following menu should appear:

Press F1 for HELP UM9 HDI System Self–Test 8052–8010–01M 09/21/94

–––[Main Menu]–––
Acceptance Test
Partial Test
Single Test
Options Menu
Debug Menu
Quit Main Menu
––––––––––––––––––

Copyright (c) 1994, ATL Inc.

2.3 Saving the Test Data on Hard Copy:

The USD Debug data and the extended diagnostics data are saved by two different procedures. This procedure assumes the laptop computer is connected to the HDI system via the null modem cable and both are powerup. This procedure also assumes you are in the diagnostics program.

2.3.1 Saving the Diagnostic Data to a Floppy Disk:

1. Install a formatted high density disk in the "A" drive on the laptop computer.
2. In the extended diagnostic program select the option menu.

–––[Main Menu]–––
Acceptance Test
Partial Test
Single Test
Options Menu
Debug Menu
Quit Main Menu
––––––––––––––––––––

3. Select the "OPTION MENU" and verify the "TEST OPTION MENU" as below:

–––––––––[Test Options Menu]–––––––––

Single Step	**Off**
Beep on Error	**Yes**
Display Mode	**Normal**
Error Handling	**Pause**
Loop Count	**0**
Restore Defaults	
Screen Lines	**25**
Screen Blanking	**Off**
Error Log File	**On**
File Name:	**ERROR.LOG**
Quit Option Menu	

4. Highlight the "File Name: ERROR.LOG" and click on the mouse and verify the menu below:

–––––––––––––––––––––––––––––[Error Log File]–––––––––––––––––––––––––––––

Please enter the Log File name:

A:\XXXXXXX.LOG

––

5. ENTER A:\ THE SERIAL NUMBER OF THE SYSTEM . LOG and select the "enter" key on the computer.
6. Highlight "Quit" on the "Option" Menu and click on the mouse. (This will take you back to the "Main Menu".

The program is now setup to open a word doc.file on the floppy disk in the "A" drive. All test results will be downloaded to the word doc.file under the "S.O Number.LOG" file.

NOTE: *The word doc. file can be directed to the "C" drive (hard drive) by entering C: * directory\ SERIAL NUMBER.LOG

2.3.2 Saving the "USD Terminal" Diagnostic Data to a File:

This procedure is assuming you are logged in to the "USD TERMINAL" menu under the "DEBUG" menu. This procedure must be set up first prior to capturing the data on the laptop.

--[Debug Menu]--
USD Terminal
FEC Terminal
Dual Terminal
View Error Log
Quit Menu
----

1. Press "F9" key on the keyboard, this will bring up the following menu:

Serial port already opened as: COM1:19200,N,8,1

____ Option Menu ____
_
SYSTEM USD PORT Initialized Macros ^M _
Printer Menu _
Serial Port Menu _
Run DOS Program _
Dos Shell _
Window Menu _
_
Quit Terminal _
_
____

2. Highlight the “Printer Menu” and click on the mouse, this will bring up the following menu :

SYSTEM USD POR__________________ Printer Menu ___________________

Printer OFF
Printer ON
Print to FILE
Name: TERM1.FIL

Quit Menu

3. Highlight the “name: TERM1.FIL” menu and click on the mouse.
4. Name the file the serial number of the system or name of the institute with the .fil extention and click on the mouse.
5. Highlight the “Print to File” menu and click on the mouse.This will open up the text file with the .fil extention on the “C’ drive under the “diag directory”.
6. Verify the text file has been created by toggling back to the “Diag” directory on the “C” drive under “File Manager”.

NOTE: *If the file directory is empty, follow the procedure to associate the file with text information:*

1. *Under file manager click on file –highlight “Associate” and click on the mouse.*
2. *Enter “fil” under the “files with extentions” command.*
3. *Enter “NOTEPAD. EXE” under the “Associate With” command and click on OK.*
4. *Exit out and back into file manager and verify the file will open as a text file.*

2.4 Extended Diagnostics:

The function of the self–test software is to interrogate the hardware modules (PCB assemblies with on–board slave microprocessors and diagnostics) and verify that the hardware modules return test results indicating no errors.The software will ask the hardware modules to to test themselves and ensure proper communications back to the control bus master (CPU PCB) for proper functionality of the HDI system.

Also tested is the system software to ensure no corrupt files on the hard drive.This is done by ensuring the proper checksum code (the command CSALL) is matched with the CPU PCB and software on the harddrive.

The USD terminal can be used for troubleshooting frontend and control bus (lockup) problems. This software package is backwards compatible to all software levels of the HDI system.

NOTE: *The following PCB assemblies listed in the self–test diagnostics are not tested:*
All scan–converter PCB
ADDA PCB
MFE1 AND MFE2 PCB

All tested hardware modules results and status will be pass or fail.When a failure occurs all hardware module indicate a error code that will indicate the particular failure.

Troubleshooting hints:

If a failure occurs prior to removing the pcb verify the checksum is correct for that particular software level by using the HDI system production test panel “firmware level” and also check RBS boot status. See HDI Service Manual P/N 4720–0013–XX under fault isolation.

Remove the suspected failed PCB assembly and verify proper compatibility, jumper configuration and correct board level prom is installed by visual inspection prior to replacing.

2.4.1 Extended Diagnostics Main Menu:

–––[Main Menu]–––
Acceptance Test
Partial Test
Single Test
Options Menu
Debug Menu
Quit Main Menu
––––––––––––––––––

2.4.2 Sub–directories:

ACCEPTANCE TEST:
VALID TEST
Do you have a International system ? (y or n)
Do you have a greyscale system (y or n)
Do you have a ESP system? (y or n)
Do you have a Advance Graphics pcb ? (y or n)
(Answer yes with a 7500–0554–xx or a 7500–0864 pcb assembly)
Do you have AA frontend ? (y or n) (Wide Apeture Scanhead)
In this configuration correct ? (y or n)
USD communication check:
Pass: Go’s to the ” SOFTWARE BASELINE”
Fails: Error message appears ”could not detect a USD prompt, reboot the system ”

TROUBLESHOOTING HINT:

Check the null modem cable connection from the laptop to the HDI system.

CSALL:
HARDDRIVE SOFTWARE FILE CHECK
ALL FILES SHOULD PASS. ANY FAILURE IS A RESULT OF A CORRUPTED SOFTWARE FILE ON THE HARDDRIVE.

REPLACE THE HARDDRIVE.

PCB CHECK BY SEQUENCE

STATUS CODES:

PASS	FAIL	NOT CONFIGURED

CSALL	IFO–MASTER
CONTROL PANEL	ESP IFO SLAVE
SYSTEM CPU	CDP
SCAN CONV. (NOT TESTED)	ECHO INPUT
FRAME GRABBER	MOTOR CONTROLLER
SCROLLING GRAPHICS	MFE2 (NOT TESTED)
CF SCROLLING GRAPHICS	MFE 1 (NOT TESTED)
AVP– VIDEO	FEC
AVP– VTR	PULSER CALIBRATION
M–MODE	
PHYSIO	
SYSTEM MEMORY	
SPECTRAL ESTIMATOR	
ADDA– NOT TESTED	

OPTIONS MENU

STANDARD SETUP NOT FOR TEST
THIS IS TO SETUP A HARDCOPY LOG ON THE ”A” OR ”C’ DRIVE ON THE LAPTOP:
SEE SECTION 2.3 (SAVING DATA TO DISK)

	DEFAULT
SINGLE STEP	OFF
BEEP ON ERROR	YES
DISPLAY MODE	NORMAL
ERROR HANDLING	PAUSE
LOOP COUNT	O
RESTORE DEFAULTS	
SCREEN LINES	25 LINES
SCREEN BLANKING	OFF
ERROR LOG FILE	OFF
FILE NAME:	ERROR.LOG
QUIT OPTION MENU	

DEBUG MENU

USD TERMINAL:
THIS ESTABLISHES THE USD PROMPT:

DEBUG COMMANDS:

CSALL:

This command verify's the system software on the harddrive is not corrupted.

EH– ERROR HANDLER

This commands opens the UM–9 HDI system error log information for capturing errors reported the system CPU. This may be useful for front–end and control bus lockup issues.

(Use the L (Logger) and F (Full format) command for anaylyzining data.

RBS – RETURN BOOTUP STATUS:

This command will bring up the control bus status of all the slave PCB's reporting to the CPU.

Any failure will indicate a hardware issue with the slave pcb.

Stubbed or hyphen will indicate the pcb does not preform the bootup test and should be ignored.

HLOG:

The purpose of this command is to keep a software log of all PCB part number's and serial numbers of the system for reference.

DOS:

This will allow you to type in DOS commands for troubleshooting the HDI system or transfer customer user defined setups to and from the HDI system.

DOS COMMANDS:

DIAGNOSE C:

This will allow you to check your hardrive for hardware disk errors.

See Appendix E for the results.

TRANSFERRING USER DEFINED SETUPS:

Use only the disk UM–9 HDI SYSTEM DATA SAVE/RECALL DISK part number: 4252–0550–02.

To save user defined defaults to disk:

1. Press STORE key on the SETUP panel.
2. Access the USD terminal mode and the DOS command.
3. Place the SAVE/RECALL disk in the A: drive of the laptop computer.
4. Type A: and press ENTER on the keyboard.
5. Type Save and press Enter.

To recall system data :

1. Access the USD terminal mode and the DOS command.
2. Place the floppy disk in the A: drive of the laptop computer.
3. Type A: and ENTER.
4. Type RECALL and press ENTER.
5. Press the RETRIEVE key on the SETUP panel of the HDI system.

NOTE: *Using the USD TERMINAL MODE can isolate the following Problems:*
SCANHEAD POWER MONITOR FAULTS
NO SCANHEAD CALIBRATION
NO 2D, DOPPLER OR COLOR ISSUES.

See Appendix C for Fault Isolation Error Codes.

F9 USD TERMINAL MODE COMMANDS

Press F1 for HELP   UM9 HDI System Self–Test 8052–8010–01M 09/21/94

PgUp Review   SYSTEM USD PORT

Serial port already opened as: COM1:19200,N,8,1

____ Option Menu ____

Macros ^M
Printer Menu
Serial Port Menu
Run DOS Program
Dos Shell
Window Menu

Quit Terminal

MACROS
TO BE DETERMINED

PRINTER MENU
To store data to hardcopy

SERIAL PORT MENU
System serial port setup

RUN DOS PROGRAM
TO BE DETERMINED

DOS SHELL

TO BE DETERMINED

WINDOW
PRESET NOT USED

QUIT TERMINAL
To exit out of the USD Terminal Mode

3.0 FRONT END DIAGNOSTICS:

3.1 Hardware Setup:

1. Locate the J19 RS232 port on the rear of the HDI system and the 9 pin Com port connector located on the back of the laptop computer.
2. Connect the 25 pin connector to J19 and the 9 pin connector to the laptop computer.
3. Power up the HDI system.

3.2 Software Setup:

1. Under "Program Manager" find the "DIAGNOSTIC" program group and double click.
2. Find the program item icon "FRONTEND DIAG HDI" and double click. The following menu should appear:

```
Press F1 for HELP          UM9 HDI Front End Test   8052–8110–01M  09/22/94

                  –––[ Main Menu ]–––
                    Acceptance Test
                    Partial Test
                    Single Test
                    Options Menu
                    Debug Menu
                    Quit Main Menu
                  –––––––––––––––––––

              Copyright (c) 1994, ATL Inc.
```

3.3 Saving the Test Data on Hard Drive:

The USD Debug data and the extended diagnostics data are saved by two diffenent procedures. This procedure assumes the laptop computer is connected to the HDI system via the null modem cable and both are powerup. This procedure also assumes you are in the diagnostics program.

3.3.1 Saving the Diagnostic Data to a Floppy Disk:

1. Install a formatted high density disk in the "A" drive on the laptop computer.
2. In the frontend diagnostic program select the option menu.

---[Main Menu]---
Acceptance Test
Partial Test
Single Test
Options Menu
Debug Menu
Quit Main Menu
----

3. Select the "OPTION MENU" and verify the "TEST OPTION MENU" as below:

---------[Test Options Menu]---------

Single Step	**Off**
Beep on Error	**Yes**
Display Mode	**Normal**
Error Handling	**Pause**
Loop Count	**0**
Restore Defaults	
Screen Lines	**25**
Screen Blanking	**Off**
Error Log File	**On**
File Name:	**ERROR.LOG**
Quit Option Menu	

--

4. Highlight the "File Name: ERROR.LOG" and click on the mouse and verify the menu below:

-------------------------[Error Log File]--------------------------

Please enter the Log File name:

A:XXXXXXX.LOG

--

5. ENTER A: THE SERIAL NUMBER OF THE SYSTEM . LOG and press the "enter" key on the computer.
6. Highlight "Quit" on the "Option" Menu and click on the mouse. (This will take you back to the "Main Menu").

The program is now setup to open a word doc.file on the floppy disk in the "A" drive.All test results will be downloaded to the word doc, file under the "S.O Number.LOG" file.

NOTE: *The word doc. file can be directed to the "C" drive (hard drive) by entering C: \ directory\ SERIAL NUMBER.LOG*

3.3.2 Saving the "USD Terminal" Diagnostic Data to Hardcopy:

This procedure is assuming you are logged in to the "USD TERMINAL" menu under the "DEBUG" menu. This procedure must be set up first prior to capturing the data on the laptop.

--[Debug Menu]--
USD Terminal
FEC Terminal
Dual Terminal
View Error Log
Quit Menu
----

1. Press "F9" key on the keyboard, this will bring up the following menu:

Serial port already opened as: COM1:19200,N,8,1

____ Option Menu ____

SYSTEM USD PORT Initialized Macros ^M
Printer Menu
Serial Port Menu
Run DOS Program
Dos Shell
Window Menu

Quit Terminal

2. Highlight the "Printer Menu" and click on the mouse, this will bring up the following menu :

SYSTEM USD POR_________________ Printer Menu __________________

Printer OFF
Printer ON
Print to FILE
Name: TERM1.FIL

Quit Menu

3. Highlight the “name: TERM1.FIL” menu and click on the mouse.
4. Name the file the serial number of the system or name of the institute with the .fil extention and click on the mouse.
5. Highlight the “Print to File” menu and click on the mouse. This will open up the text file with the .fil extention on the “C” drive under the “diag directory”.
6. Verify the text file has been created by toggling back to the “Diag” directory on the “C” drive under “File Manager”.

NOTE: *If the file directory is empty follow the procedure to associate the file with text information:*

1. *Under file manager click on file –highlight “Associate” and click on the mouse.*
2. *Enter “fil” under the “files with extentions” command.*
3. *Enter “NOTEPAD. EXE” under the “Associate With” command and click on OK.*
4. *Exit out and back into file manager and verify the file will open as a text file.*

3.4 Data Package Front End Diagnostics:

The function of the front–end test software is to verify the 2D echo noise levels processed from the array front–end are consitent across every reciever and voltage levels are consistent across every transmitter.The far field and channel noise test can be used to isolate the system channel PCBs and a scanhead.

HARDWARE REQUIRED

DESCRIPTION	**PART NUMBER**
ATL TEST SPLITTER	4500–1618

3.4.1 Front End Diagnostics Main Menu:

–––[Main Menu]–––
Acceptance Test
Partial Test
Single Test
Options Menu
Debug Menu
Quit Main Menu
––––––––––––––––––––

ACCEPTANCE TEST:
NOT IMPLEMENTED IN THE FIELD

PARTIAL TEST:
NOT IMPLEMENTED IN THE FIELD

SINGLE TEST: SUB MENU

SETUP
FAR FIELD NOISE TEST
CHANNEL NOISE TEST
2D PULSER TEST
DOPPLER PULSER TEST
CLEANUP
QUIT MENU

SETUP MENU :

This is to setup the software program prior to the “Far Field Noise” and the “Channel Noise” Test. This is assuming the hardware is setup between the HDI system and the lap-top computer as stated in section 3.1

1. Disconnect all scanheads from the HDI system.
2. Connect the ATL test splitter to the Left Port on the Scanhead Select PCB assembly.

Checking USD interface – USD alive
LEVEL ***(3, 4,5,6) detected
Do you have a ESP system ? (Y,N)
ENTER S/O NUMBER
IS THIS CORRECT ?

CHECKING APPLICATION
CURRENT TEST SCANHEAD NONE (CALIBRATION)

EXIT OUT OF THE SETUP MENU

FAR FIELD NOISE:

This will check for excessive noise in the far field.

1. Disconnect all the scanheads from the HDI system and connect the ATL test splitter to the Left Port on the Scanhead Select PCB assembly
2. Select the ” Far Field Noise” Test on the menu.
3. A message appears ”SELECT THE LEFT TRANSDUCER PORT ”.
4. Select the ”XDR” hardkey on the HDI system .
5. Select the left box (transducer select) .This will select a FAKE SCANHEAD for test.

PASS

All channel boards are within tolerance.

FAIL

Detected a faulty channel Bd.
Error message: ”Noise Level too High” ––Detected a faulty channel board ”.
To determine the faulty channel board pcb assembly run the channel noise test.

CHANNEL NOISE TEST :

This test can be used to troubleshoot image quality issues to determine a faulty channel board.

This test will detect a noisy or a weak pulser on a channel board.

A high db number above the mean average (typical mean –70db) will indicate a noisy element or channel on that particular channel board. A low db number below the mean average will indicate a weak element or channel.

Refer to Appendix B UM–9 HDI Array Element Map to indicate which channel board is at fault.

Troubleshooting Hint:

If all channel boards fail reseat all the Channel Boards or suspect the Scanhead Select PCB.

2D PULSER TEST

NOT IMPLEMENTED IN THE FIELD

DOPPLER PULSER TEST

NOT IMPLEMENTED IN THE FIELD

CLEANUP

This is a soft reboot of the HDI system. This is recommended before running the “Far Field ” or “Channel Noise” test for accurate results.

DUAL TERMINAL

NOT IMPLEMENTED IN THE FIELD

VIEW ERROR LOG

Captures all data of the “Far Field” or “Channel Noise” test and gives a summary of all the results.

This is not the HDI Error Logger.

Appendix A. Command Key Functions

COMMAND KEYS

F1	HELP MENU
F2	STEP OFF/ON
F3	DISPLAY NORMAL – VERBASE
F4	BEEP YES – NO
F5	ON ERROR PAUSE – CONTINUE – LOOP
F6	RESTORE DEFAULTS
F7	PRINTER ON – OFF
F9	OPTIONS MENU (QUIT TERMINAL IN USD PORT)

DEFAULT MENU

F2 STEP	F3 DISPLAY	F4 BEEP	F5 ON ERROR	F6 RESTORE	F10 QUIT
ON	NORMAL	YES	PAUSE	DEFAULTS	

Appendix B. UM–9 HDI Array/Element Map

	0		1		2		3		Device
	0	1	0	1	0	1	0	1	Channel
Board 0	01	64	02	63	03	62	04	61	
	65	128	66	127	67	126	68	125	
Board 1	08	57	07	58	06	59	05	60	
	72	121	71	122	70	123	69	124	
Board 2	09	56	10	55	11	54	12	53	
	73	120	74	119	75	118	76	117	
Board 3	16	49	15	50	14	51	13	52	
	80	113	79	114	78	115	77	116	
Board 4	17	48	18	47	19	46	20	45	
	81	112	82	111	83	110	84	109	
Board 5	24	41	23	42	22	43	21	44	
	88	105	87	106	86	107	85	108	
Board 6	25	40	26	39	27	38	28	37	
	89	104	90	103	91	102	92	101	
Board 7	32	33	31	34	30	35	29	36	
	96	97	95	98	94	99	93	100	

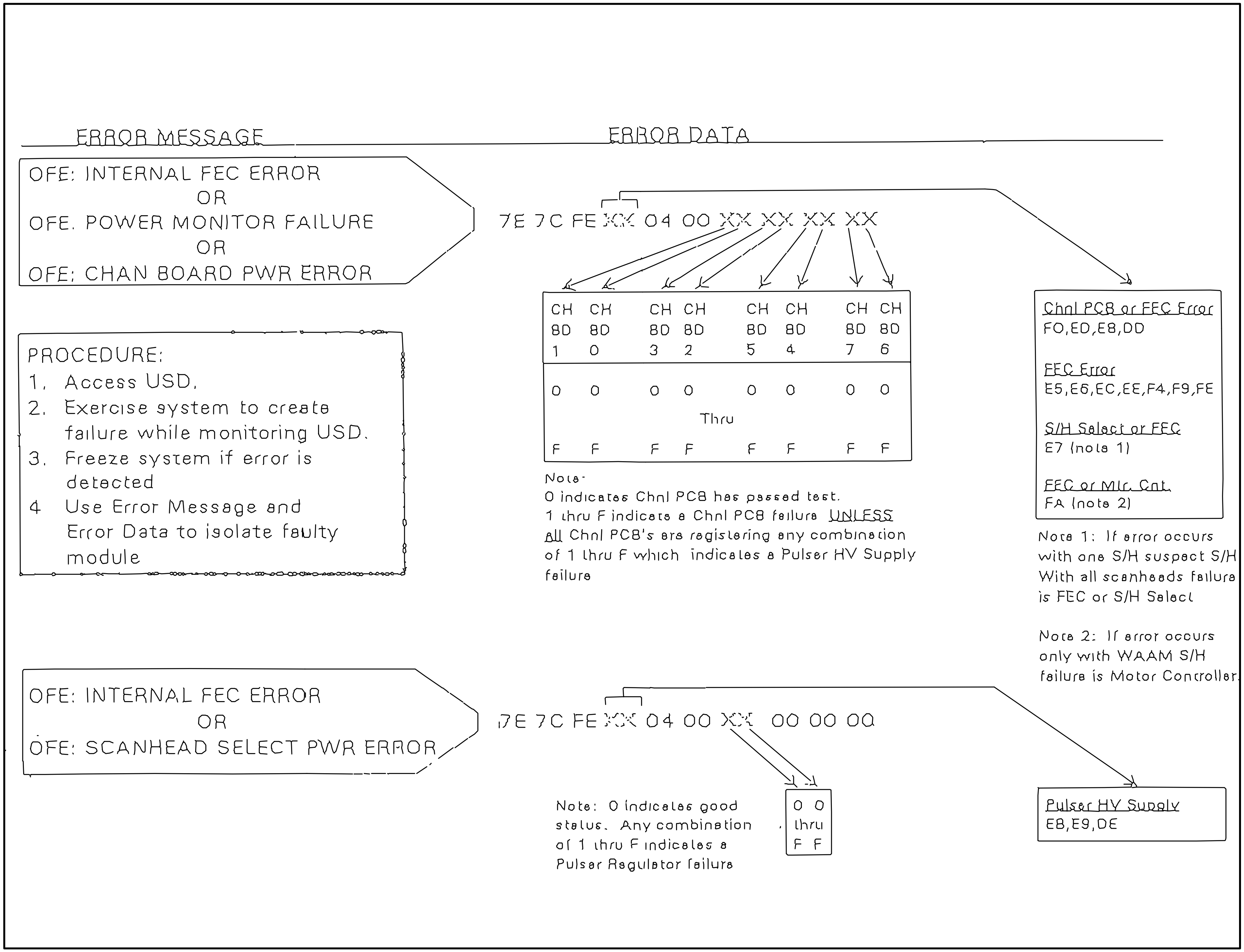
OFE Test Panel [Walk 0 or 1] functional display

1 ELE PIN B D C E

XMT:
RCV.

Board Element (0,1)
Channel (0,1)
Device (0-3)
Board Number (0-7)

Appendix C. UM–9 HDI Power Monitor – USD Error Chart



Appendix D. FEC Diagnostic Error Codes

During “RBS” Test:

FEC error codes can isolate hardware faults on:

- Front End Controller PCB
- S/H Select PCB
- S/H Select Daughter PCB
- Channel Board PCBs

7C020$\boxed{0000}$

The last four digits of the hex FEC error codes give the test identifier and error number. The test identifier occupies the first two digits.

7C020$\boxed{00}$00

From this information a suspect PCB is isolated.

Example: At the "RBS" test the following error code is displayed.

7C020$\boxed{56}$10

The test identifier indicates Channel PCB 7 as faulty.

TEST IDENTIFIER CHART

01	FEC	42	CHNL PCB 2	54	CHNL PCB 5
02	FEC	43	CHNL PCB 3	55	CHNL PCB 6
03	FEC	44	CHNL PCB 4	56	CHNL PCB 7
04	FEC	45	CHNL PCB 5	57	CHNL PCB 0
05	FEC	46	CHNL PCB 6	58	CHNL PCB 1
30	PWR SUPPLY	47	CHNL PCB 7	59	CHNL PCB 2
31	S/H SELECT	48	FEC	5A	CHNL PCB 3
32	HV ENABLE	49	FEC	5B	CHNL PCB 4
33	S/H SEL. OR HV SUPPLY	4A	FEC	5C	CHNL PCB 5
34	S/H SEL. OR CHNL PCB	4B	FEC	5D	CHNL PCB 6
35	S/H SEL. DAU. PCB	4C	FEC	5E	CHNL PCB 7
36	CHANNEL PCB	4D	FEC		
37	S/H SELECT	4E	FEC		
38	FEC	4F	CHNL PCB 0		
39	FEC OR CHNL PCB 1 OR 2	50	CHNL PCB 1		
3A	CHNL PCB	51	CHNL PCB 2		
40	CHNL PCB 0	52	CHNL PCB 3		
41	CHNL PCB 1	53	CHNL PCB 4		

NOTE: 34, 35 could also be FEC or S/H Select Dau. PCB.

Appendix E. Results for the Diagnose C: Command

PARTITION SECTOR	**GOOD**
BOOT SECTOR	**GOOD**
BOOT DIRECTORY	**GOOD**
FAT AGREEMENT	**GOOD**

0	**INVALID CHAINS**
0	**SHARED CHAINS**
0	**UNDETERMINED CIRCULAR CHAIN**
0	**FILES – WITH BAD SECTOR**
0	**LOST CLUSTERS**
0	**BAD CLUSTERS**
0	**UNFLAGGED – BAD SECTORS**

THIS IS PASS CONDITION

ANY NUMBERS OTHER THAN 0 OR THE WORD FAIL APPEARS, REPRESENTS A CORRUPTED HARDDRIVE.

IF A FAILURE OCCURS THAN REBOOT THE SYSTEM (SEE CLEANUP) AND TRY THE TEST AGAIN FOR ACCURATE RESULTS.

ATL Service Bulletin

Customer Support

SB HDI:_59

Date: April 23, 1996
File: 96_59

WITH ATTACHMENTS:
WITH PARTS:

To: All Field Service Personnel
Author(s): Laurence J. Simanek

C.O. No.:
C.A.R.:

SUBJECT: HDI BREAST LESION SONOGRAPHY

PROBLEM: Notification to the field organization about the reference material that the customer will use for 'Breast Lesion Sonography.'

CAUSE: FDA Approval

SCOPE: UM-9HDI Only

EFFECTIVITY: 4/23/96

SOLUTION: A new Preliminary addition to the HDI Reference Manual for Breast Lesion Sonography is available. **Pay particular attention to sections 2-1 through 5-1 which describes the Quality Assurance Program that either the customer or ATL must perform on the system every six months.**

MATERIALS: Sonography Reference Manual **4703-0026-03**.

ATL Service **B**ulletin

Customer Support

SBHDI:_60___REV:___

Date: 10/25/96
FILE: 96_60

WITH ATTACHMENTS:
WITH PARTS:
C.O. No.:

Author(s): Guido Hussels

C.A.R.:

1 PAGE

SUBJECT: UM9 HDI Scrolling Graphics PCB's

PROBLEM: **UM9 HDI graphics display in scrolling modes (M-Mode and Doppler).**

:

EFFECTIVITY: **All UM9 HDI systems.**

:

DESCRIPTION: **Depending on the configuration of the Graphic PCB's installed in the UM9 HDI, the displayed graphics in the scrolling modes are different.**

1 - If the Master Scrolling Graphics PCB (PN 7500-0515-01) and the Display Graphics PCB (PN 7500-0514-01) are installed, a vertical white bar is displayed at the beginning and the end of the scrolling section.

2 - If the Scrolling Graphics Display PCB (PN 7500-0864-01) or the Advanced Frame Grabber PCB (PN 7500-0554-01) is installed, the white bars are not displayed.

This difference does not affect the function of Doppler or M-Mode.

ATL Service Bulletin

Customer Support **SB HDI:_61___REV:________**

Date: March 17, 1997 WITH ATTACHMENTS:
File: 97_61 WITH PARTS:
To: All Field Service Personnel **C.O. No.:**
Author(s): Jerry Schweitzer **C.A.R.:**

Page 1 of 1

SUBJECT: UM9-HDI False Diagnostic Error

PROBLEM: **The Diagnostics' IFO End to End Test fails the Read/Write IBICS and the Synthetic End to End tests if the 7500-0592-07 IFO module is installed with 19.04 (all versions) system software. The indications are erroneous**

CAUSE: **False Test Positive due to configuration**

SCOPE: **UM9-HDI with v21904 (all versions) and single IFO module (ie. non-ESP)**

EFFECTIVITY: **Immediate**

SOLUTION: **Advise users to ignore IFO Synthetic End to End and IBIC Read/Write diagnostic self test results. DO NOT replace IFOM if no other problems are indicated.**

MATERIALS: **None**

PROCEDURE:

NOTES:

- **The 7500-0783 board passes above tests with all software versions.**
- **The problem occurs when older systems with 7500-0592-07, are upgraded to new software.**
- **The 7500-0592-07 boards have been returned to Service with this problem reported.** ***These boards produce a NTF result in test.***

ATL Service Bulletin

Technical Support Center

Bulletin No. HDI_62 rev. B
(This Bulletin Supercedes Hot Tip 98-68 and Bulletin No. HDI_62a of the same title)

Date: March 11, 1999
FILE: P:\CSR_DOCS\BULLETIN\HDI\99_HDI_62b.DOC
To: All Field Service Personnel
Author: Lisa Quast/Rob Stevens/Bill Sikich

WITH ATTACHMENTS: None.
WITH PARTS: None.
C.O. No.: N/A.
C.A.R.: N/A.

SUBJECT: Year 2000 Time/Date Issues with the Ultramark 9 HDI OB.

PROBLEM: **The functionality of the UM9 HDI operating system will be unaffected by any year 2000 date/time issues, including leap year calculations, with the exception of OB report and graphing functions. For systems configured with the OB option, the Gestational Age (GA) and Estimated Due Date (EDD) of the OB report are not always calculated and displayed between the years 1999 and 2000. For examination dates between 3/1/00 and 12/31/00, and a Last Menstrual Period (LMP) on or before 2/29/00, GA will be calculated one day earlier than the actual date and EDD will be calculated one day later than the actual date. Also, previous exam information for data acquired between the year 1999 and 2000 will not be displayed on OB graphs.**

SCOPE: **UM9 HDI systems with option 8500-8300-01 (OB-GYN Analysis) and/or 8500-8326-01 (OB/GYN System Settings) ONLY.**

EFFECTIVITY: **Immediate.**

SOLUTION: **Upgrade the ultrasound system to software level 20.x (UM9 HDI Y2K Upgrade.**

NOTE: This is NOT a baseline upgrade for all Ultramark 9 HDI customers. This upgrade is to be installed on Ultramark 9 HDI OB systems ONLY.

In the United States

1. ***SoundCare®, FullCare®, and warranty OB customers in the United States will receive priority installation of the upgrade at NO CHARGE.***

2. *SharedCare® OB customers may purchase the upgrade for one event credit.*

3. *QCare® OB customers may purchase the upgrade for $2,100 (list price less their 30% discount).*

   - **To obtain an upgrade kit for the customers described above, contact your CSC Upgrade Coordinator and order one of following two part numbers:**

     - For systems with V218.02D or higher software order kit P/N: English 8000-1609-01 (software disks only).

     - For systems with software V214.12 to V217.05 order kit P/N: English 8000-1612-01 (software disks and PROMS).

   - **After you receive the upgrade kit, schedule an installation date and schedule time with your customer to review the year 2000 upgrade. For SharedCare customers, ensure the upgrade is documented as a service event. For QCare customers, ensure the upgrade cost is invoiced. The installation deadline of April 1, 1999 must be met to avoid OB calculation errors.**

4. *Customers that purchase a SoundCare or FullCare service support plan for their Ultramark 9 HDI OB system will receive the upgrade at NO CHARGE.*
   - **Please work directly with your Account Administrator for any Ultramark 9 HDI OB users interested in purchasing a support plan.**

5. *For those customers not mentioned above, a software only upgrade will be available for $3,000.*
   - **Their local Field Service Engineer can provide this upgrade on a time and materials basis.**

Outside the United States

1. SoundCare® and warranty customers will receive the upgrade at no charge.

- **Starting November 20, 1998 you may order the upgrade kits for your SoundCare® and warranty customers. Please use the normal order process to place your order for the Ultramark 9 HDI year 2000 upgrade kit.**

- **Select one of the following:**

  -Kits without proms (18x to 20x software)
  English 8000-1609-01

French 8000-1610-01
German 8000-1611-01
-Kits with proms (14x to 20x software)
English 8000-1612-01
French 8000-1613-01
German 8000-1614-01

- **After you receive the upgrade kit, schedule an installation date before April 1, 1999 and schedule time with your customer to review the year 2000 upgrade. The installation deadline of April 1, 1999 must be met to avoid OB calculation errors.**

2. **Customers that purchase a SoundCare® service support plan for their <u>Ultramark 9HDI OB</u> system will receive the upgrade at no charge.**

3. **Starting November 20, 1998 you may order the upgrade kits for customers not protected by SoundCare® or warranty.**

- **End user price is $3,000 USD.**
- **Please use the normal service order process to place your order for any Ultramark 9 HDI OB users interested in purchasing the upgrade only.**

If you have any questions, please contact your regional Technical Services Group representative or country Manager.

ATL Service Bulletin

Customer Support

SB HDI: _63_REV:________
(This Bulletin Supercedes Hot Tip 99-11)

Date: 1 March, 1999 | **WITH ATTACHMENTS: No**
FILE: P:\CSR_DOCS\BULLETIN\HDI\99HDI63.DOC | **WITH PARTS: No**
To: All Field Service Personnel | **C.O. No.: No**
Author(s): Tony Hartford | **C.A.R.: 921**

SUBJECT: OB Calc Change after UM9 HDI 20.X Software Upgrade

PROBLEM: **The customer reports, "After unfreezing the image, the OB, GYN, or Fertility calcs will remain up on the screen." Some FSE's have perceived that the user is referring to the cursors. The cursors are disappearing, but it is the status bar on the right that is staying. Customers are confused because their process has changed.**

SCOPE: **The change was made in software level 19.04 in response to several customer complaints regarding the old method. Previous to 19.04, unfreezing the image would remove the calc package.**

EFFECTIVITY: **Any system upgraded to the 20.00 software for Y2K.**

SOLUTION: **Educate the customer. Once the user knows what has changed and what the benefit is (i.e. less keystrokes) they have been most receptive. The table below reflects what each calculation package does after unfreezing the image.**

Calculation Package	Before 19.04	19.04 and up
Cardiology	Up	Up
Fertility	Down	**Up**
Gynecology	Down	**Up**
OB	Down	**Up**
Radiology	Down	Down
TCD	Up	Up
Vascular	Up	Up

Up = Calc package displayed.
Down = Calc package removed.

ATL Service Bulletin

Customer Support

SB HDI: _64__REV:________

Date: 27 April, 1999
FILE: P:\CSR_DOCS\BULLETIN\HDI\99hdi64.DOC
To: All Field Service Personnel
Author(s): Patrick Kinnaman

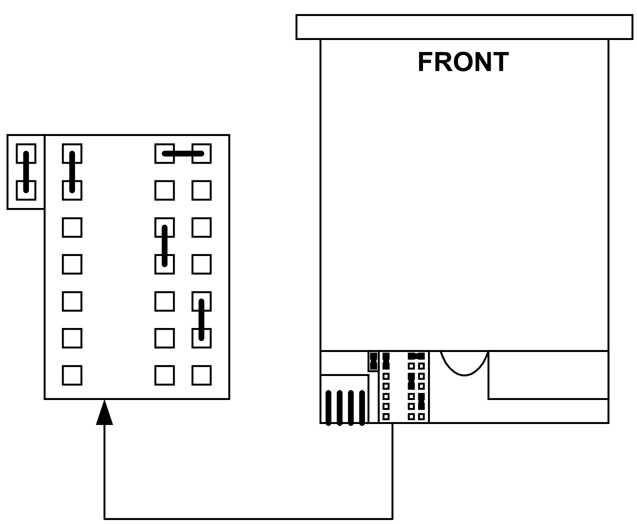
WITH ATTACHMENTS:
WITH PARTS:
C.O. No.:
C.A.R.:

SUBJECT: New Floppy Drive for UM9HDI

SCOPE: This will introduce a new Floppy drive p/n 2100-1605-01 which will be the preferred drive to order for the UM9HDI ultrasound system. This will make the floppy drive p/n 2100-0793-01 an alternate. The floppy drive is accessed by the technician during upgrades and repairs to save system settings. Also included is the configuration of the drive for reference.

EFFECTIVITY: Immediate

SOLUTION: Two new kits have been created; one that contains the new drive and it's related metric hardware – p/n 8000-1772-01 (preferred) and another that contains the old drive and it's standard hardware – p/n 8000-1773-01.
When ordering a drive for the UM9 HDI system, the only part numbers that are now available for shipment are these two kits.
See below for jumper settings. All drives, p/n 2100-1605-01 (kit p/n 8000-1772-01) will be set this way at the factory.
Configure according to figure below



8 Replaceable Parts

8–1 Introduction

This section is intended for use by ATL customer support representatives. The section lists the major field replaceable parts for the Ultramark 9 HDI System. The parts listed are at the current recommended replacement level at the time of this printing.

Any hardware compatibility issues are addressed, as applicable, in this section.

8–2 Description

An explanation of each column contained in the tables follows:

- Figure Number (Fig. No.)

This column lists the figure number of the illustration on which a replaceable part is found.

- Index Number (Index No.)

  This column lists the index number that identifies an item on the figure in which the item appears.

- Reference Designator (Ref. Des.)

  This column lists the identifier that is either attached to the item or located nearby (e.g., A1 is the reference designator, located on the PCB extractor, for the PCB installed into slot A1). Not all replaceable parts have reference designators; they are most commonly found on PCBs.

- ATL Part Number (ATL P/N)

  This column lists the ATL part number for a replaceable part. The ATL part number is used to order a part.

  Revision levels of part numbers with a “–XX” suffix may be referenced in Section 5A.

- Description

  This column provides a breakdown of the equipment into its assemblies, subassemblies, detail parts, and some attaching parts. The column entries are indentured to show relationships of parts to their next higher assemblies. Where appropriate, the description column also includes parts description data (i.e., size, tolerance, type, model, or material).

- Notes

  This column provides additional information applicable to a replaceable part.

8–3 Parts Ordering Information

- Customer Support Representatives

  For parts ordering procedure, ATL customer support representatives should refer to their Standard Operating Procedures Manual.

- Customers

  U.S. Customers may order parts directly by calling ATL Customer Service Order Processing. Contact your local customer support representative for the telephone number.

  Customers must provide the following information:

  1. Shipping address
  2. Purchase order number
  3. ATL part number
  4. Description
  5. Quantity

8–4 Abbreviations

AA	Annular Array
ACQ	Acquisition
ADPTR	Adapter
ADDA	Advanced Digital Data Analyzer PCB
AFG	Advanced Frame Grabber PCB
AMP	Ampere
ASSY	Assembly
AVP	Advanced Video Processor PCB
AWG	American Wire Gauge
BRKT	Bracket
B/W	Black and White
CDP	Color Data Processor PCB
CFM	Cubic Feet/Minute
CKT	Circuit
CM	Centimeter
CMS	Cable Management System

CONN	Connector
CPU	Central Processing Unit
CW	Continuous Wave
DAASR	Digital Acquisition, Analysis, Storage and Retrieval
DBF	Digital Beamformer
DOM	Domestic
DOP	Doppler
ECG	Electrocardiogram
EIM	Echo Input Module
EUR	European
EXT	External
FEC	Front End Controller
FT	Foot
GS	Grayscale
HD	Head
HORIZ	Horizontal
HV	High Voltage

IFOM	IF Output Module
IN	Inch
INT	Internal
INT'L	International
I/O	Input/Output
ISO	Isolated
IVT	Intravaginal Transducer
KEYBD	Keyboard
KW	Kilowatt
LA	Linearr Array
LT	Left
LH	Left Hand
MB	Motherboard
MFE1	2D Acquisition PCB
MFE2	Doppler Acquisition PCB
MIC	Multi-Image Camera
MM	Millimeter

MMC	Mercury Motor Controller PCB
NTSC	National Television System Committee
OAG	Output Address Generator
OD	Outside Diameter
OEM	Optional Equipment Module
OPT	Optional
PA	Phased Array
PAL	Phased Alternating Line
PCB	Printed Circuit Board
PS	Power Supply
PWR	Power
PROM	Programmable Read Only Memory
RAD	Radiology
RAM	Random Access Memory
REF	Reference
RF	Radio Frequency

RGB	Red Green Blue
RH	Right Hand
ROM	Read Only Memory
RPT	Receptacle
RT	Right
SGD	Scrolling Graphics Display PCB
ST CW	Steered Continous Wave
SW	Switch
TB	Trackball
TBA	To Be Added
TBD	To Be Determined
TBL	Table
TERM	Terminal
UM	Ultramark
US	United States
V	Voltage
VAC	Volts Alternating Current

VCR	Video Cassette Recorder
VDC	Volts Direct Current
VFC	Video Format Converter PCB
VID	Video
VED	Video Encoder/Decoder PCB

Table 8–1. Ultramark 9 HDI System

Fig/Ind No.	ATL Part No.	Description	Notes
8–1	**UM-9 HDI SYSTEM**		
1		Video Monitor Assy	Tbl 8–2
2	3500-1239-XX	Control Panel Assy, Dom	Tbl 8–3
	3500-1238-XX	Control Panel Assy, Int’l	Tbl 8–3
	3500-1520-XX	Control Panel Assy, Dom	Tbl 8–3
	3500-1521-XX	Control Panel Assy, Int’l	Tbl 8–3
3	3500-1320-XX	Keyboard Assy English	Tbl 8–4
	3500-1321-XX	Keyboard Assy, French	
	3500-1322-XX	Keyboard Assy, German	
4		Card Cage Assy	Tbl 8–5
5		Power Supply Assy	Tbl 8–6
6		Transformer Assy	Tbl 8–7
7	2100-0386	Fan, 18–30V, 94 CFM (Qty 6)	
8	2100-0793-01	Floppy Disk Drive, 3.5”, 1.44 MB	
9	1065-1587-01	Disk Drive Cover Plate	

Fig/Ind No.	ATL Part No.	Description	Notes
10		Hard Disk Drive English	Tbl 5B–2 (P/N is software dependent)
		Hard Disk Drive French	Tbl 5B–3 (P/N is software dependent)
		Hard Disk Drive German	Tbl 5B–4 (P/N is software dependent)
11	2950-0409-01	Drawer Slide, 23”, Pair	
12	2950-0436-02	Drawer Slide, 15”, left or right hand, single unit of issue	
13	3000-0369-02	Front Door Enclosure	MIC
	1065-1766-02	Front Door Enclosure (requires hinge P/N 2950-0521-01)	Blank
	1065-1767-02	Front Door Enclosure (requires hinge P/N 1065-0477)	P71
	1065-1765-02	Front Door Enclosure (requires hinge P/N 1065-0477)	CP100
	1065-1759-02	Front Door Enclosure (requires hinge P/N 1065-0477)	UP5000

Fig/Ind No.	ATL Part No.	Description	Notes
	1065-2123-01	Front Door Enclosure, Generic (requires mounting plate adapter P/N 1065-2145-01 and hinges P/N 2950-0521-01)	UP5250, Aspect MIC
14	3000-0368-01	Front Cover	
	1065-1990-02	Front Cover, Modified	Level 5 DAASR, Alt: 1065-1990-01
15	110-26638-05	Door Retainer Cable (Qty 1)	
16	125-26400-02	Keyboard Slide	
	1516-0048	Screw, 6–32 x 3/16 PNH, rear	4 plcs. Attaches keyboard to slide
	1516-0112	Screw, 6–32 x 1/4 PNH, front	2 plcs. Attaches keyboard to slide
	2950-0559-02	Keyboard Slide	Alt: 2950-0559-01
	1516-0091	Screw, 6–32 x 1/4 FLH	4 plcs. Attaches keyboard to slide
17	1065-0477	Hinge, 90 Gooseneck	
18	1065-1002-02	Bracket Keyboard Latch	
19	1065-1010-03	Keyboard Structure Bracket	

Fig/Ind No.	ATL Part No.	Description	Notes
20	111-27275-02	Wire Assy, Jumper 10”	
21	118-26640-02	Stiffener, Door	
22	2950-0391	Catch, Roller, Nylon, White	
23	1065-1175-01	Handle, Front End	2 plcs.
24	3900-0015-01	Lamp, Panel, 50 x 25 mm, CLLENS,1 2V, Gray	
25	1065-1197-01	Bracket Scanhead, Connector Light	
26	3500-1038-01	Cable Assy, Connector Light	
27	1065-1439-02	Lower Cover Assy	7500-0588 MB only
	1065-1439-03	Lower Cover Assy	7500-0677 MB only
	1065-1439-04	Lower Cover Assy	7500-0677 MB only
28	2100-0310	Speaker, 5”, 8 OHM, 15 W	
29	7500-0433-XX	Audio Buffer PCB	
30	1065-1524-02	Right Side Panel Assy	
31	3000-0367-01	Right Side Enclosure Assy	
32	1065-1441-03	Left Side Panel Assy	7500-0588 MB only
	1065-1441-04	Left Side Panel Assy	7500-0677 MB only

Fig/Ind No.	ATL Part No.	Description	Notes
33	3000-0366-02	Left Side Enclosure Assy	Alt: 3000-0366-01
	1065-1586-03	Left Side Enclosure Assy for 7350 VCR	
34	3500-1319-XX	ECG Assy	
35	1065-1539-03	Rear Door Enclosure	
36	1065-1519-02	Rear Door Cover Assy, UP5000	
	1563-0174	Ball Stud, 5/8L 6–32 x 0.25	4 plcs. Attaches to item 36
37	1065-1520-05	Rear Lower Panel Assy	
	2100-0538-01	Fan, 18–30VDC, 94 CFM	
	2100-0166-01	Fan Guard	
38	3500-1257-XX	Rear Panel Assy, NTSC	
	4100-0461-01	¯ Label, Rear Panel	
39	3500-1256-XX	Rear Panel Assy, PAL	
40	3000-0364-01	Cover, Rear Door Assy	
	1065-1768-01	Cover, Rear Door Assy, UP5000	
41	1065-2513-01	Card Cage Cover	CISPR compatible
	1065-1763-01	Top Enclosure Assy, Molded	

Fig/Ind No.	ATL Part No.	Description	Notes
OEM OPTIONS/CABLES			
42	704-10011-01	VCR (VHS), US, AG6300	
	704-10012-01	VCR (VHS), EUR, AG6200	
	2100-0525-01	VCR (SVHS), US, AG7300	
	2100-0731-01	VCR (SVHS), NTSC, HIFI, 120V, AG7350	
	2100-0630-01	VCR (SVHS), EUR, AG7330	
	2100-0732-01	VCR (SVHS), PAL, 120/220V, AG7350E	
	3500-0705-02	Cable Assy, VCR VHS Video to Rear Panel Module PCB	
	3500-0965-04	Cable Assy, VCR SVHS Video to Rear Panel Module PCB	
43	707-10010-16	Camera, US, Non-emulsion, NTSC	
	707-10010-15	Camera, EUR, Non-emulsion, PAL	
	707-10010-17	Camera, EUR, Emulsion, PAL	
	707-10010-18	Camera, US, Emulsion, NTSC	
	3500-1437-03	Aspect MIC, 120V, NTSC, English	
	3500-1439-03	Aspect MIC, 120V, PAL, English	

Fig/Ind No.	ATL Part No.	Description	Notes
	3500-1440-03	Aspect MIC, 240V, PAL, English	
	3500-1503-01	Aspect MIC, 120V, PAL, French	
	3500-1506-01	Aspect MIC, 240V, PAL, French	
	3500-1504-01	Aspect MIC, Int, 120V, PAL, German	
	3500-1507-01	Aspect MIC, Ext, 240V, PAL, German	
	2100-0693-02	Digital Image Manager (DIM), 110V, 50/60 Hz, External Connection Only	Alt: 2100-0693-01
	2100-0694-02	Digital Image Recorder, 110V, 50/60 Hz	Alt: 2100-0694-01
	2100-0484-01	Page Printer, P71, US	
	2100-0578-01	Page Printer, P71, EUR	
	2100-0604-01	Color Page Printer, CP100E, EUR	
	2100-0589-01	Color Page Printer, CP100U, US	
	3500-1048-01	Cable Assy, CP100 to Rear Panel Module PCB	
	2100-0566-01	Color Page Printer, UP5000, US	
	2100-0629-01	Color Page Printer, UP5000, EUR	
	2100-0733-01	Color Page Printer, UP5200, US	

Fig/Ind No.	ATL Part No.	Description	Notes
	2100-0742-01	Color Page Printer, UP5250, NTSC	
	2100-0743-01	Color Page Printer, UP5250, PAL	
	3500-1640-01	Color Page Printer, UP5200 MD, with new feet, Int, NTSC	
	1065-2145-01	Mounting Plate Adapter (required for generic front door enclosure P/N 1065-2123-01)	UP5250
	2950-0521-01	Hinges (required for front door enclosure P/N 1065-2123-01)	UP5250
	3500-1099-01	Cable Assy, UP5000 Remote Adapter to Rear Panel Module PCB	
	3500-1363-01	Cable Assy, UP5000 Control 2 Remote/ Print Busy	
	3500-1100-02	Cable Assy, UP5000 Monitor Out Adapter to Rear Panel Module PCB	
	3500-1100-01	Cable Assy, UP5000 Monitor Out Adapter to Rear Panel Module PCB, Int'l	
44	2100-0436-01	Freeze Frame Camera, US, External	
	2100-0641-01	Page Printer, UP850, External	

Fig/Ind No.	ATL Part No.	Description	Notes
	2100-0652-03	Printer Dot Matrix	
	2100-0701-01	Page Printer UP910, External	
	2100-0862-01	Page Printer, UP890MD 120V/230V	
45	3000-0365-02	Scanhead Holder Assy	
46	118-26394-03	– Scanhead Holder Insert	
47	1065-1966-01	Insert Gel Bottle	
	1064-0534-01	Phased Array Holder	
	1064-0535-01	Linear Array Holder	
	1064-0536-01	IVT Holder	
	1064-0597-01	TRT Holder	
	3500-1461-01	Footswitch Assy, (3 switches)	Adds VCR footswitch to 2-position switch
	503-10001-05	– Footswitch, Single 2-position	
	119-23340-10	– Label, M-mode/Hardcopy	
	119-23340-11	– Label, Freeze/Print	
	119-23340-12	– Label, VCR record	

Fig/Ind No.	ATL Part No.	Description	Notes
	3300-0290-01	Footswitch, Single 2-position, Waterproof with cord	German systems only
48	1065-2177-01	Scanhead Cable Management J–Hook	
49		Scanhead Cable Management System	
	3500-1637-01	Color Page Printer, UP5250 MDP, with new feet, Int, EUR	
	3500-1639-01	Color Page Printer, UP5250 MD, with new feet, Int, NTSC	
50	1065-1608-XX	Scanhead Holder Assembly (Right or Left)	
51	1065-1613-01	Pad, Connector Pocket, Rear (3 places per scanhead holder)	
52	1065-1611-01	Pad, Connector Pocket, RH (3 places per scanhead holder)	
53	1065-1612-01	Pad, Connector Pocket, LH (3 places per scanhead holder)	
54	1065-1615-01	Pad, Connector Pocket, Bottom (2 places per scanhead holder)	
55	1065-1609-02	Pad, Connector (4 places per scanhead holder)	

Fig/Ind No.	ATL Part No.	Description	Notes
56	1065-1302-02	Pivot	Alt 1065-1302-01
	1517-0005	Screw, 8–32 x 3/8 FLH	2 plcs. each pivot (4 plcs total)
	2950-0465-01	Cover, (Pivot) 1.75” ID x 1.25” L, PVC, ST, White	
57	1065-1303-02	Socket	Alt: 1065-1303-01
58	1065-1304-01	Bracket, LH Support (Mounts to Front Cover Assy)	
59	1065-1305-02	Bracket, RH Support (Mounts to Front Cover Assy)	
	1518-0051	Screw, 10–32 x 1/2 PNH	2 plcs. each bracket (4 plcs total)
	1560-0051	Washer, Int Lk, #6	3 plcs. each bracket (6 plcs total)
	1518-0008	Screw, 10–32 x 3/4 PNH	1 plc. each bracket (2 plcs total)
	1561-0032	Washer, Ext Lk, #10	1 plc. each bracket (2 plcs total)
60	1065-1328-01	Ground Spring	

Fig/Ind No.	ATL Part No.	Description	Notes
	1516-0074	Screw, 6–32 x 3/8 PNH	2 plcs. each spring
61	1065-2103-04	Scanhead Holder, Molded	Level 5
	3500-1513-01	Non-DAASR Assy	Level 5
62	1065-2114-01	– Frame, without Optical Drive, Metal	Level 5
63	1065-2128-01	– Insert, Gel Bottle	Level 5
64	1065-2103-04	– Scanhead Holder, Molded	Level 5
	2100-0008	Headphones	

Table 8–2. Video Monitor

Fig/Ind No.	ATL Part No.	Description	Notes
8–2	**VIDEO MONITOR ASSY**		
1	2100-0756-02	Color Monitor, Data Ray, 10-inch	Alt: 2100-0756-01
	2100-0668-01	Color Monitor, Data Ray, 9-inch	Alt: 2100-0756-02 is preferred
2	3500-1430-01	Monitor Chassis Assy (B/W Monitor) (without lower screen P/N 1065-0679-03)	Alt: 3500-1433-01 or 111-27363-10[1]
	3500-1430-02	Monitor Chassis Assy (B/W Monitor) (without lower screen P/N 1065-0679-03)	
	3500-1430-03/ -04	Monitor Chassis Assy (B/W Monitor) (without lower screen P/N 1065-0679-03)	
3	1065-1781-01	Dual Monitor Bezel	
	4100-0434-01	Label, Monitor Bezel	
	1065-0906-02	Monitor Bezel Gasket	
4	3500-0781-01	Microphone Assy	
5	1065-0678-01	Upper Screen	
	1065-0678-02	Upper Screen	
6	1065-0679-03	Lower Screen	

Fig/Ind No.	ATL Part No.	Description	Notes
7	1700-0016-01	Power Supply, +24VDC, LAMBDA	
8	1065-1764-01	Cover, Dual Monitor	
9	2100-0334	LED, Amber, Fresnel	
10	2481-0015	LED, Yellow, 1.6 V	
11	126-22984-01	Knob, Trim Control	
12	3500-0843-03	Cable Assy, Monitor LED Control	
13	1065-1185-01	Strap, Braid, 6”, #6 Lugs	
14	1065-0635-01	Bracket Bezel	
15	3500-0766-02	Cable Assy, Color Monitor Power	
16	3500-0773-02	Cable Assy, Color Monitor Signal	
17	3500-0896-01	Cable Assy, B/W Monitor Power/Signal	
18	3500-0897-01	Cable Assy, Lambda Power Supply Input	
19	3500-0767-03	Cable Assy, Power To Monitor Assy (Qty 2)	

1. P/N 3500-1433-01 contains lower screen assembly 1065-0679-03 and is 100% compatible with 3500-1430-01. P/N 111-27363-10 is functionally equivalent to 3500-1430-01 but without the lower screen assembly 1065-0679-03. The lower screen assembly cannot be installed in the field.

Table 8–3. Control Panel

Fig/Ind No.	ATL Part No.	Description	Notes
8–3			
	3500-1239-05	Control Panel Assy, Dom	
	3500-1238-05	Control Panel Assy, Int’l	
	3500-1520-01	Control Panel Assy, Dom (Quick Print Interface)	Level 5
	3500-1521-01	Control Panel Assy, Int’l (Quick Print Interface)	Level 5
	3500-1520-02	Control Panel Assy, Dom (Quick Print Interface)	Level 5, Backlit SET/ ENTER buttons
	3500-1521-02	Control Panel Assy, Int’l (Quick Print Interface)	
	3500-1520-03	Control Panel Assy, Dom (Quick Print Interface)	
	3500-1521-03	Control Panel Assy, Int’l (Quick Print Interface)	
1	1065-1761-01	Molded Control Panel	
2	1065-0927-01	Cursor Buttons, Dom	Used on 3500-1239-05
	1065-1056-01	Cursor Buttons, Int’l	Used on 3500-1238-05
3	1065-0813-02	Control Panel Pushbutton Set, Dom	Used on 3500-1239-05

Fig/Ind No.	ATL Part No.	Description	Notes
	1065-0853-01	Control Panel Pushbutton Set, Int’l	Used on 3500-1238-05
4	3300-0265-05	Clear Membrane Switch	
5	1065-0827-02	Molded Knob	
6	7500-0689-XX	Control Panel Interface PCB	
	7500-0757-XX	Control Panel Interface PCB	Level 5
7	7500-0442-XX	Trackball Switch PCB	
8	1065-2001-02	Filter Overlay	
9	126-25264-01	Incremental Encoder	
10	7500-0441-XX	Mode Switch PCB	
11	3900-0010	Plasma Display	
12	2100-0461-01	Trackball	
13	7500-0436-XX	Tact Switch PCB Assy	
14	7500-0448-XX	– Switch Daughterboard PCB	
15	1065-1159-01	Sleeve, Slidepot (Qty 8)	
16	1065-1182-01	Spacer, Slidepot (Qty 1)	

Fig/Ind No.	ATL Part No.	Description	Notes
17	1065-0813-03	Control Panel Pushbutton Set, Dom	Used on 3500-1520-XX
	1065-0853-02	Control Panel Pushbutton Set, Int'l	Used on 3500-1521-XX

Table 8–4. Keyboard Assembly

Fig/Ind No.	ATL Part No.	Description	Notes
Ref	3500-1320-02	Keyboard Assembly, English	Old ATL logo
Ref	3500-1320-03	Keyboard Assembly, English	New ATL logo
Ref	3500-1321-02	Keyboard Assembly, French	Old ATL logo
Ref	3500-1321-03	Keyboard Assembly, French	New ATL logo
Ref	3500-1322-02	Keyboard Assembly, German	Old ATL logo
Ref	3500-1322-03	Keyboard Assembly, German	New ATL logo
1	126-26364-01	‾ Keyboard, 57 Key, English	
	126-26364-03	‾ Keyboard, 57 Key, German	
	126-26364-04	‾ Keyboard, 57 Key, French	

Fig/Ind No.	ATL Part No.	Description	Notes
2	1065-1755-02	¯ Cover, Keyboard	
3	111-26379-01	¯ Cable Assembly, Keyboard to Control Panel Interface PCB	
4	1065-1011-01	¯ Strain Relief, Keyboard Cable	
5	1065-1893-01	¯ Bracket, Keyboard	Only on old ATL logo. Alt: 118-26382-02
	1065-1893-02	¯ Bracket, Keyboard	Only on new ATL logo
6	1065-1240-04	¯ Latch/Bracket Assembly	Alt: 1065-1240-02
7	1065-1818-02	¯ Ground Strap, Copper	
8	1065-1010-02	Bracket, Keyboard Structure	
9	1065-1002-02	Bracket, Keyboard Latch	
10	1065-1001-01	Bracket, Latch Adjustment	
11	6220-0072-01	Keyboard Latch Assy, UM9, includes items 6 and 9	Not illustrated

Table 8–5. Card Cage Assembly

NOTE: Index numbers are correct only for systems with the 7500-0588 motherboard. Refer to Section 5B for PCB slot designations for systems with various other PCB configurations..

Fig/Ind No.	ATL Part No.	Description	Notes
8–5	**CARD CAGE ASSEMBLY**		
1	7500-0405-XX	Image Memory	
	7500-0722-XX	Image Memory	
	7500-0569-XX	Image Memory Module 64 Meg	Level 5 only
2	112-25337-XX	M-mode/Physio	
	7500-0671-XX	M-mode/Physio	
3	7500-0573-XX	System CPU	
	7500-0749-XX	System CPU	
4	7500-0515-XX	Scroll/BW Display Graphics	

Fig/Ind No.	ATL Part No.	Description	Notes
5	7500-0514-XX	Scroll/Color Display Graphics	
	7500-0864-XX	Scrolling Graphics Display	
6	7500-0556-XX	Frame Grabber	Not used on Level 4
	7500-0554-XX	Advanced Frame Grabber	
7	3500-1200-XX	Advanced Video Processor NTSC	
	3500-1201-XX	Advanced Video Processor PAL	
	3500-1444-XX	Advanced Video Processor PAL	
8	7500-0499-XX	Output Address Generator, Gray	
9	7500-0557-XX	Interface, Gray	
10	7500-0558-XX	Dual Buffer Memory	
11	7500-0557-XX	Interface, Color	
12	7500-0499-XX	Output Address Generator, Color	
13	7500-0382-XX	Spectral Estimator, Color	
14	7500-0603-XX	Advanced Digital Data Analyzer	

Fig/Ind No.	ATL Part No.	Description	Notes
15	7500-0692-XX	Echo Input Module	
16	7500-0617-XX	Mercury Motor Controller	
17	7500-0602-XX	Color Data Processor	
	7500-0829-XX	Color Data Processor	
18	7500-0592-XX	IF Output Module	
	7500-0783-XX	IF Output Module	A16 – Master A15 – Slave
19	7500-0615-XX	Doppler Acquisition	
20	7500-0655-XX	Mechanical 2D Acquisition	
21	7500-0570-XX	Front End Controller	
	7500-0754-XX	Front End Controller	
22	7500-0544-XX	Channel	
	7500-0755-XX	Channel	
	7500-0772-XX	Channel	
23	7500-0629-XX	Scanhead Select	

Fig/Ind No.	ATL Part No.	Description	Notes
24	7500-0636-XX	Scanhead Select Daughterboard	
25	7500-0588-02	Motherboard Backplane PCB	
	7500-0677-01	Motherboard Backplane PCB	
26	111-26600-01	Cable Assy, Scan Converter Single Jumper	
27	111-26601-01	Cable Assy, Scan Converter Double Jumper	
28	3500-0804-01	Cable Assy, Dual Buffer Memory to Color Scan Conv. to Color Scan Conv. OAG	
29	3500-1226-03	FEC to Scanhead Select Daughterboard	
30	1065-1462	PCB Extraction Tool (Extraction Pin on left side)	

Table 8–6. Power Supply

Fig/Ind No.	ATL Part No.	Description	Notes
8–6		**POWER SUPPLY ASSY**	
1	3500-1237-03	Power Supply, Digital, 1000W	
2	3500-1131-03	Power Supply, Pulser, +48Vdc	
3	1700-0050-01	Power Supply, 6V, 17A (Qty 2)	
4	1700-0055-01	Power Supply, 15V, 25W (16.5V) (Qty 2)	
5	1700-0054-01	Power Supply, 15V, 50W	
6	1700-0028-01	Power Supply, 15V, Adj, 7A	
7	3600-0124	Grommet, Flexible	
8	3100-1262	Terminal Block, 24 Pos, 3 Circuit	
9	9903-0355-01	Ground Strap, Insulated	
10	2208-0059	Cable Tie (Qty 4)	
11	2208-0073	Cable Strap, #8 Mount, 6” L (Qty 2)	
12	3100-1867-01	Term, Tab, 0.25, 45 Deg, 0.171 Hole, Tin	
13	3500-1162-01	Cable Assy, AC Fan	
14	3500-1304-01	Cable Assy, 12Vdc	

Fig/Ind No.	ATL Part No.	Description	Notes
15	3500-1164-01	Cable Assy, 12V Jumper	
16	3500-1312-01	Cable Assy, Analog Power Supply Output	
17	3500-1234-01	Cable Assy, Pulser To S/H Select Module	
18	3500-1215-01	Cable Assy, 5V, -5.2V Sense	
19	3500-1183-02	Cable Assy, Power Supply Output	
20	2275-0285-01	Cable Assy, Pulser Power Supply Control	
21	3500-1306-01	Cable Assy, 1000W Power Supply (12V, 5.2V)	
22	3500-1161-01	Cable Assy, Duplex Outlet	
23	3500-1109-02	Cable Assy, Air Temp Probe	
24	3500-1212-04	Bus Bar Cable (Digital Power Supply)	
26	3500-1151-01	Bus Bar Assy (Digital Power Supply to MB)	
27	3500-1125-03	Cable Assy, Pulser to Lambda Power Supply (48V)	
28	3500-1124-03	Cable Assy, Pulser Power Supply Input	
29	3500-1311-02	Cable Assy, Analog Power Supply	
30	3500-1382-02	Cable Assy, AC	
31	3500-1168-02	Cable Assy, Bus Bar	

Table 8–7. Transformer

Fig/Ind No.	ATL Part No.	Description	Notes
8–7		**TRANSFORMER ASSY**	
1	2601-0018-02	Isolation Transformer, 2.2 KVa	
2	3402-0006	Filter, RFI, 47–63 Hz, 30A, 250 Vac	
3	2100-0386	Fan, 18–30 Vdc, 94 CFM	
4	1065-0504-03	Foam Air Filter	Alt: 1065-0504-02
5	2700-0119	Circuit Breaker, 15A, 240 Vac	120V, 15A
	2700-0120	Circuit Breaker, 20A, 240 Vac	100V, 120V, 20A
	2700-0186	Circuit Breaker, 10A, 240 Vac	240V
6	2950-0509-01	Caster, 8-inch, Rear, Total Lock	For mobile customers only
	2950-0712-01	Caster, 8-inch, Rear, Mobile, Total Lock	
	2950-0511-01	Caster, 6-inch, Rear, Total Lock	
7	2950-0508-01	Caster, 8-inch, Front, Swivel Lock	
	2950-0711-01	Caster, 8-inch, Front, Mobile, Swivel Lock	
	2950-0510-01	Caster, 6-inch, Front, Swivel Lock	

Fig/Ind No.	ATL Part No.	Description	Notes
	2950-0583-01	Caster, Heavy Duty II, Swivel Lock, 6” Gray w/green Plastisol tab	
8	112-25930-02	Footswitch PCB	
9	2100-0679-03	DC Fan Speed Control PCB	
10	1064-0494-01	Endcaps	
11	3100-1053	Connector Plug, 20A, Hospital Grade	
	3100-0714	Connector Plug, 15A, 125 Vac	
	111-24280-02	Power Cord, 240 Vac	
12	3500-1162-01	Cable Assy, AC Blk Gnd	
13	3500-1155-01	Cable Assy, Line Filter Output	
14	3500-1159-01	Cable Assy, Pioneer AC	
15	3500-1156-02	Cable Assy, On/Off Switch (includes switch 3300-0283-01)	
16	3500-0767-02	Cable Assy, Monitor Power, CF, Lower	
	3500-0852-05	Panel Assy, Power Conversion, 120Vac, 15A	

Table 8–8. Miscellaneous System Cable Assemblies

Fig/Ind No.	ATL Part No.	Description	Notes
1	3500-1308-02	Ground Wire to P1 Pin 7 (Input Power)	
2	3500-1123-02	TB1 to Pulser Power Supply	
3	3500-1159-01	Line Filter to Digital Power Supply	
4	3500-1154-01	TB2 to Rear Panel Fan Cable Conn	
5	3500-1153-01	Rear Panel Fan Cable	
6	3500-0844-05	Rear Panel PCB to MB	Alt: 3500-0844-04
7	3500-1135-01	Floppy/Hard Drive from MB	
8	3500-1174-01	Fan Assy Power from TB2 (+12V)	
9	3500-1221-02	DC Fan Power Extension	
10	3500-1173-03	Fan Controller PCB	
11	3500-1305-02	AC Ground	
12	3500-0732-01	Microphone Assy Conn to Card Cage Conn	
13	3500-0850-04	AVP PCB to VCR (VCR Interface Cable)	7500-0588 MB only

Fig/Ind No.	ATL Part No.	Description	Notes
	3500-1419-01	AVP PCB to VCR (VCR Interface Cable)	7500-0677 MB only
	3500-1419-02	AVP PCB to VCR (VCR Interface Cable)	7500-0677 MB only
14	3500-1136-02	Hard Drive to CPU	
15	3500-0838-02	Floppy Disk to MB	
16	9903-0355-01	Ground Strap, Insulated, Jumper EM Filter	
17	3500-0704-03	RGB Video Conn to Rear Panel Module PCB	
18	3500-0896-01	B/W Video Monitor to Connector	
19	3500-1306-01	B/W Video Conn to Rear Panel Module PCB	
20	3500-0900-01	AVP to Rear Panel Module PCB External Audio Connectors	
21	3500-0854-02	ECG Isolation PCB to ECG, Pulse, Phono	
22	3500-0853-01	MB to Rear Panel Module PCB	
23	111-26423-01	MB to ECG Isolation PCB	7500-0588 MB only

Fig/Ind No.	ATL Part No.	Description	Notes
	3500-1384-01	MB to ECG Isolation PCB	7500-0677 MB only
24	3500-1224-01	MB to Rear Panel Module PCB	
25	3500-1225-01	MB to Rear Panel Module PCB	7500-0588 MB only
	3500-1225-02	MB to Rear Panel Module PCB	7500-0677 MB only
26	3500-0849-02	MB to Audio Buffer PCB	
27	3500-0845-02	Audio Buffer PCB to Connector	
28	3500-0847-02	Audio Buffer PCB to Speakers	
29	3500-0830-03	Audio Conn to Rear Panel Module PCB	
30	2275-0283-01	Temperature Sensor	
31	111-26423-01	MB to ECG Isolation PCB	
32	111-26423-01	MB to ECG Isolation PCB	
33	3500-1247-01	Footswitch	
34	2245-0043	Input Power Cord	
35	3500-1303-01	Control Interface PCB to MB	

Fig/Ind No.	ATL Part No.	Description	Notes
36	3500-0839-01	Trackball SW to Control Panel Interface PCB	
37	111-26492-01	Membrane SW to Control Panel Interface PCB	
38	111-26379-01	Keyboard to Control Panel Interface PCB	
39	111-25931-01	Footswitch PCB to Control Panel Interface PCB	
40	111-25932-04	Control Panel Interface PCB to MB	7500-0588 MB only
	3500-1385-01	Control Panel Interface PCB to MB	7500-0677 MB only
41	3500-0958-02	Mode SW J1 to Control Panel Interface PCB	
42	111-26383-01	Plasma Display to Control Panel Interface PCB	
43	111-26377-01	Tact SW PCB J1 to Control Panel Interface PCB	
44	3500-0798-02	Tact SW PCB J2 to Control Panel Interface PCB	
45	3500-1038-01	Control Panel Interface PCB to Light	
46	3500-0843-03	Control Panel Interface PCB to Monitor Assy LEDs	
47	111-26418-02	Control Panel Interface PCB to Int MIC (Control)	
48	111-27244-02	Control Panel Interface PCB to Ext MIC (Control)	

Fig/Ind No.	ATL Part No.	Description	Notes
49	3500-0661-03	Motor Controller to Scanhead Select Module	
50	111-27244-02	Control Panel Interface PCB to Ext MIC (Control)	
51	3500-1399-01	SSM (STCW+) to MFE2 (J1)	
52	3500-1400-01	SSM (STCW–) to MFE2 (J2)	
53	3500-1401-01	MFE1 (J3) to MFE2 (J4)	
54	3500-1213-03	Static Transducer to SSM (P6) to MFE1 (J4, Rx) and (J5, Tx)	
55	3500-1411-01	IFOM Master (A16) to IFOM Slave (A15)	Level 4 systems and up

Table 8–9. Miscellaneous System Labels

Fig/Ind No.	ATL Part No.	Description	Notes
1	4100-0611-01	Label, ATL Logo	Old Logo
2	4100-0611-02	Label, ATL Logo	New Logo
3	4100-0802-01	Label, System ID, UM9 HDI	
4	4100-0926-01	Label, System ID, UM9 HDI–CV	

Fig/Ind No.	ATL Part No.	Description	Notes
5	4100-0271	Label, System Warning	
6	4100-0336	Label, 1.0” x 0.5” Vinlyl Cloth, White	
7	4100-0355	Label, Filter Cleaning Warning	
8	4100-0434-01	Label, Dual Monitor, CF	
9	4100-0461-01	Label, Rear Panel, CF	
10	4100-0629-01	Label, 2.0” x .37”, Vinyl Cloth, White	
11	4100-0849-01	Label, Blanking (Biosponder Connector Hole)	
12	4100-0668-01	Label, Rear Panel BNC	
13	4100-0740-01	Label, Pulser Power Supply Test Points	
14	4100-0757-01	Label, Footswitch, Water Resistant	
15	4100-0758-01	Label, Card Cage, A1 to A20	
16	4100-0759-01	Label, Card Cage, A21	
17	4100-0760-01	Label, Card Cage, A22 – A29	
18	4100-0937-01	Label, PCB and Slot ID	
19	4100-0787-01	Label, Footswitch Warning	
20	4100-0805-02	Label, Security	

Fig/Ind No.	ATL Part No.	Description	Notes
21	4100-0813-01	Label, Scuff	
22	4100-0804-01	Label, ON/OFF, International Symbols	
23	4100-0840-01	Label, Warning Board Arrangement	
24	119-23340-10	Label, Footswitch, (M-Mode/Hardcopy)	
25	119-23340-11	Label, Footswitch, (FRZ–FRM/SHTTR)	
26	119-24481-02	Label, International Symbol Ground	
27	119-24481-04	Label, International Symbol	
28	119-24507-04	Label, Load Rating	
29	119-24966-02	Label, Lower Front Panel	
30	119-26685-01	Label, System ACC Equipment Warning	
31	119-27138-01	Label, Echo, Receiver, Patient	
32	119-27196-01	Label, VCR Warning	
33	119-23340-12	Label, Footswitch, Record	

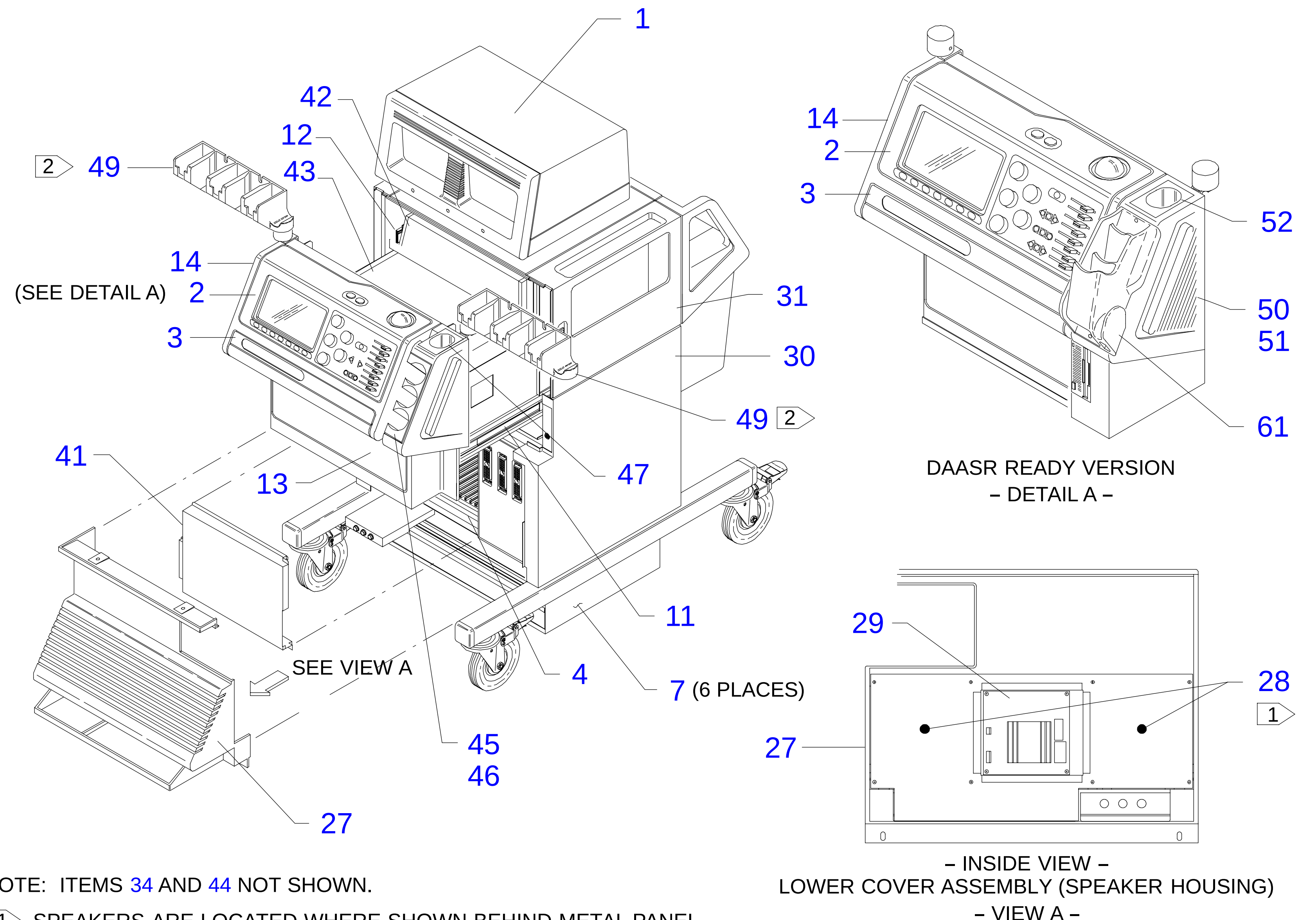
Table 8–10.   CISPR System Parts (European Systems Only)

Fig/Ind No.	ATL Part No.	Description	Notes
1	3500-1136-02	Cable Assy, Hard Disk Signal	CN 100781 all items
2	3500-1701-01	Assy, Panel CISPR, Ext. OEM	
3	1065-2507-01	Panel, Rear Extended	
4	1065-2513-01	Cover, Front Card Cage	Replaces 1065-1522-04 on CISPR and non-CISPR systems
5	1065-2514-01	Panel, Fan Mtg, 6x4	
6	3500-1719-01	Cable Assy, System Video, CISPR	
7	1065-2114-01	Frame, Without Optical Disk	
8	1065-2115-01	Housing, Without Optical Disk	
9	4100-0381-01	Label, UM4A Doppler Blanking	
10	1065-2519-01	Screen Intake	
11	1065-2517-01	Shield, M/B Card Cage	
12	1065-2536-01	Shield, EMI, Card Cage, Top, Small	
13	1065-2515-01	Shield, Card Cage Assy, Top	

Fig/Ind No.	ATL Part No.	Description	Notes
14	1065-2534-01	Shield, EMI, Card Cage, Bottom, Small	
15	1065-2516-01	Shield, Card Cage Assy, Bottom	
16	1065-2518-01	Shield, Bracket, Scanhead Select	
17	2604-0081-01	Ferrite, Sleeve, 3” Ribbon Cable	
18	2604-0063-01	Ferrite Bead, 1.0 OD, 0.50 ID, 0.25L	
19	2604-0042-01	Ferrite, Sleeve, 2 Inch Ribbon Cable	
20	2604-0064-01	Ferrite, Bead, 1.14 OD, 0.75 ID, 0.29L	
21	2604-0024	Ferrite, Sleeve, 1.4” Ribbon Cable	
22	2604-0065-01	Ferrite, Sleeve, 0.25D, Cable, 275z@100 MHz	
23	2604-0053-01	Ferrite, Sleeve, 0.59D, Cable, 90z@100 MHz	
24	2604-0067-01	Ferrite, Sleeve, 0.51D, Cable, 250z@100 MHz	
25	2604-0075-01	Ferrite, Sleeve Case, For 2604-0065-01	
26	2604-0076-01	Ferrite, Sleeve Case, For 2604-0024	
27	2604-0054-01	Ferrite, Sleeve Case, For 2604-0053-01	
28	2604-0074-01	Ferrite, Sleeve Case, For 2604-0067-01	
29	2210-0234-01	Tubing, Zipper, 1.0 ID, 45”L, Shld	

Fig/Ind No.	ATL Part No.	Description	Notes
30	2210-0235-01	Tubing, Zipper, 1.0 ID, 26”L, Shld	
31	2210-0236-01	Tubing, Zipper, 2–3/4W, 42”L, Shld	
32	2210-0237-01	Tubing, Zipper, 2.0W, 28”L, Shld	
33	2210-0238-01	Tubing, Zipper, 1–3/8W, 13”L, Shld	
34	2210-0239-01	Tubing, Zipper, 1.0 ID, 26”L, #6&10 Lug	
35	2604-0057-01	Case, Ferrite Sleeve, 2”	
36	3600-0204-01	Gasket, RFI,/Environment, W/Adhesive, 12”L	
37	3600-0250-01	Gasket, RFI, Foam/Mesh 1/4 Core, 4.5”L	
38	3600-0252-01	Gasket, RFI, Foam/Mesh 3/8 Core, 7”L	
39	3600-0253-01	Gasket, RFI, Foam/Mesh 3/8 Core, 12”L	
40	3600-0261-01	Gasket, RFI, Foam/Mesh 1/2 Core, 6”L	
41	3600-0262-01	Gasket, RFI, Foam/Mesh 1/2 Core, 19”L	
42	3600-0259-01	Grommet, Catplr, 0.112 – 0.118 Pnl, SS, Epxy	
43	3600-0262-01	Gasket, RFI, Foam/Mesh 1/2 Core, 19”L	
44	1065-2512-01	Spacer, Tin Plated/Copper	

Fig/Ind No.	ATL Part No.	Description	Notes
45	3500-1703-01	Cable Assy, CISPR, External Color Printer	
46	3500-1702-01	Cable Assy, CISPR, External VCR Record/Playback	



NOTE: ITEMS 34 AND 44 NOT SHOWN.

1 SPEAKERS ARE LOCATED WHERE SHOWN BEHIND METAL PANEL.

2 SEE SHEET 3 FOR DETAILS (B,C), CABLE MANAGEMENT SUPPORT BRACKETS.

10 ES08–A01 06

Figure 8–1. Ultramark 9 HDI System (Sheet 1 of 4)

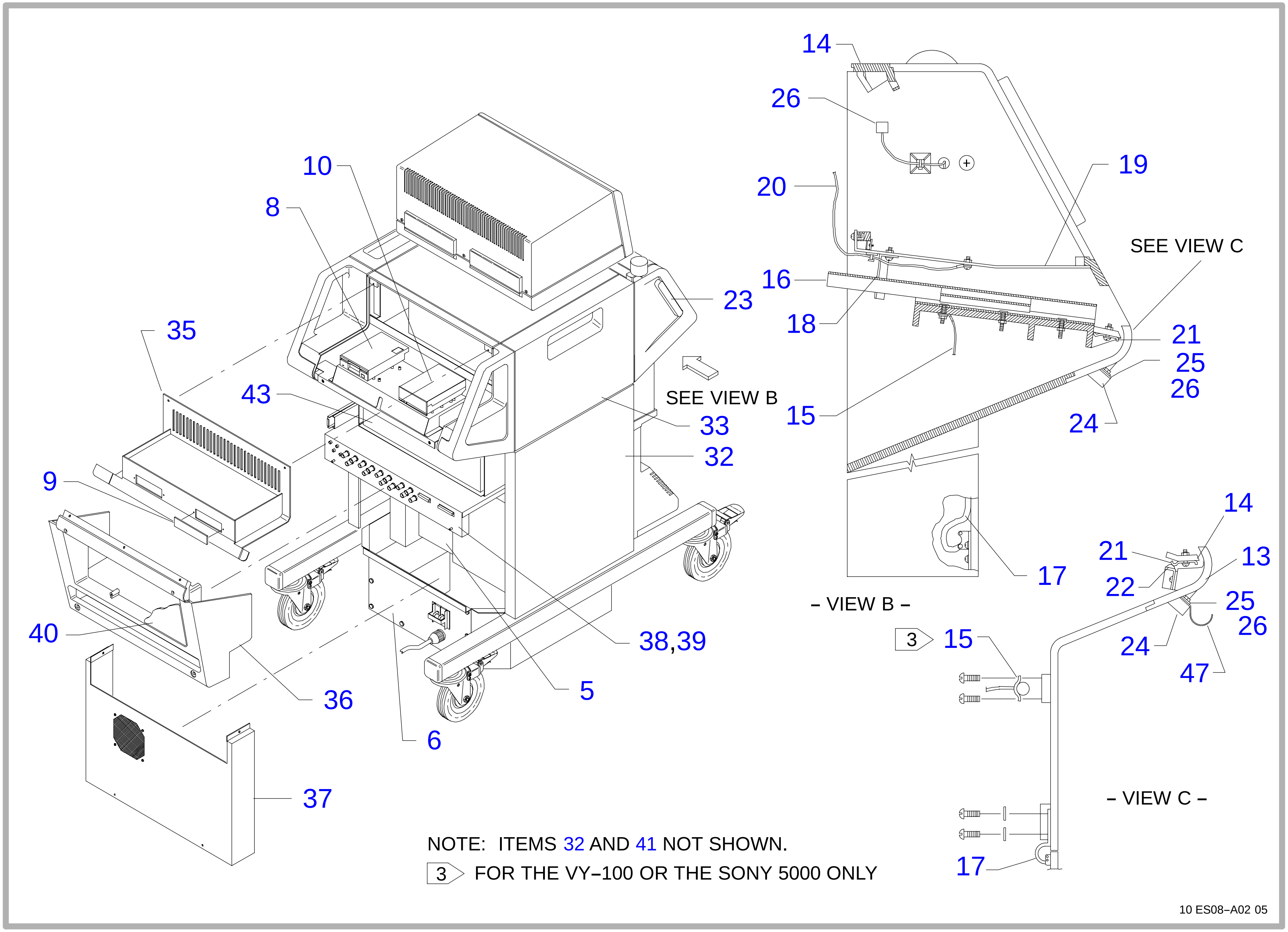


Figure 8–1. Ultramark 9 HDI System (Sheet 2 of 4)

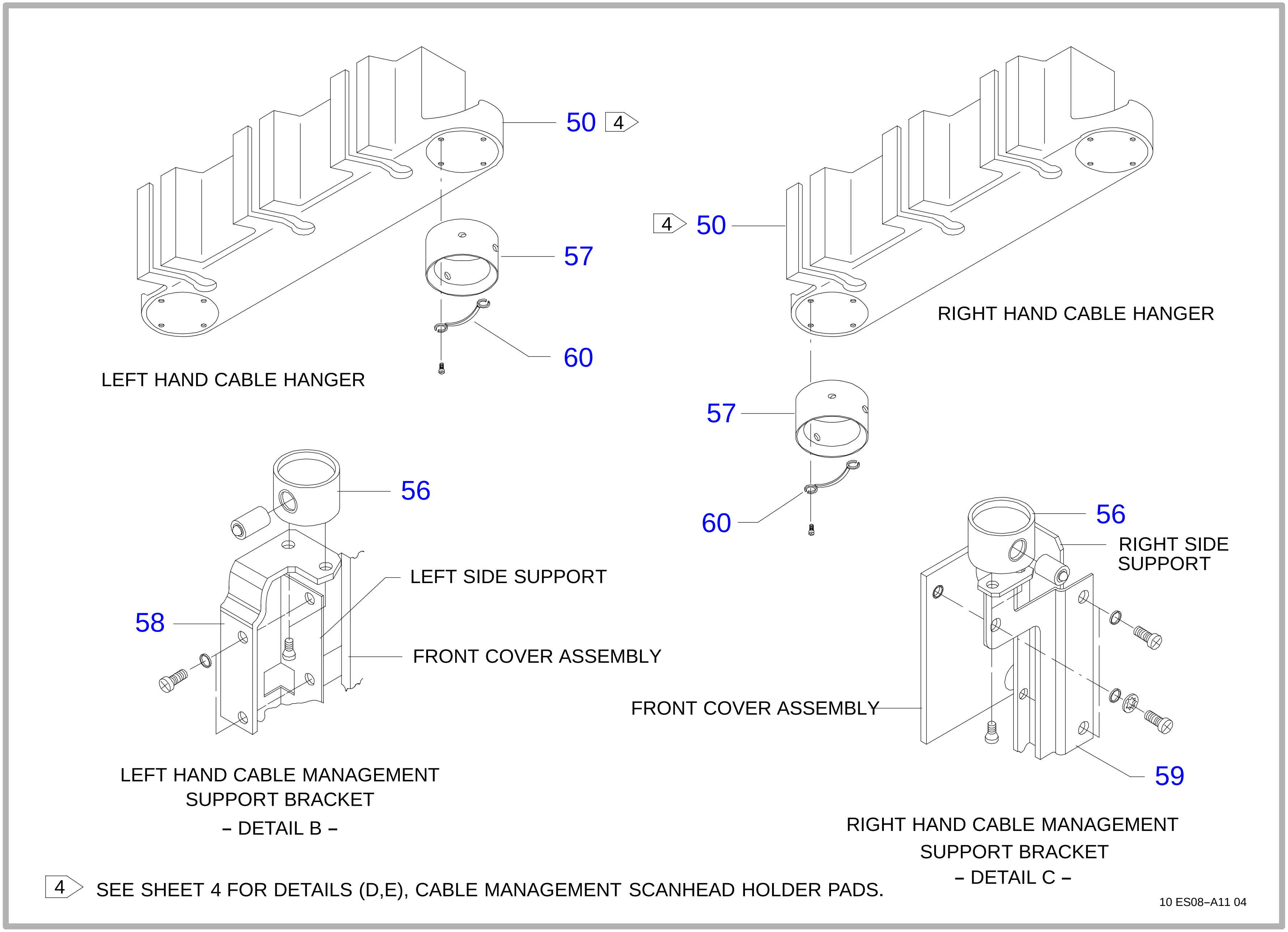


Figure 8–1. Ultramark 9 HDI System (Sheet 3 of 4)

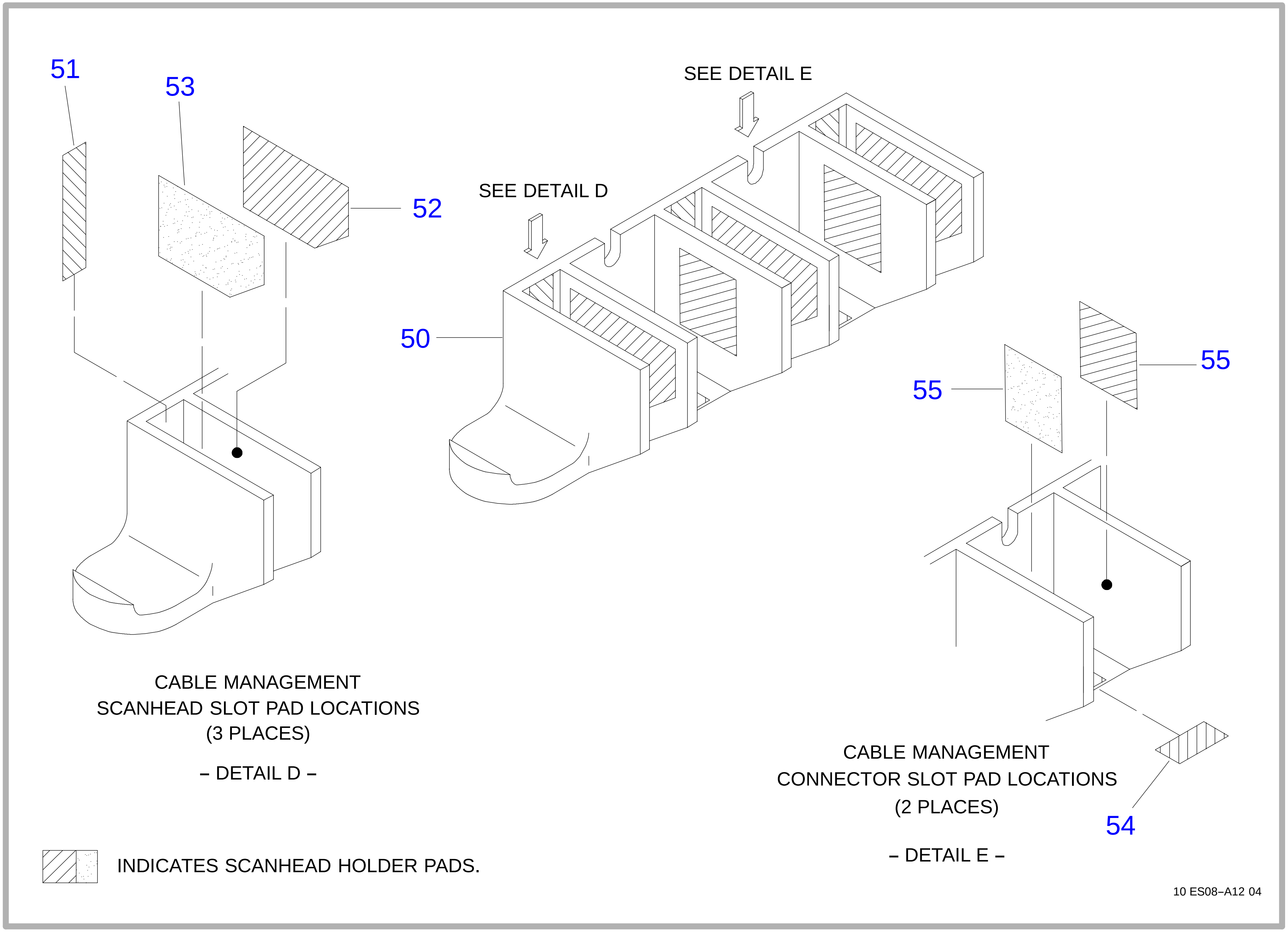


Figure 8–1. Ultramark 9 HDI System (Sheet 4 of 4)

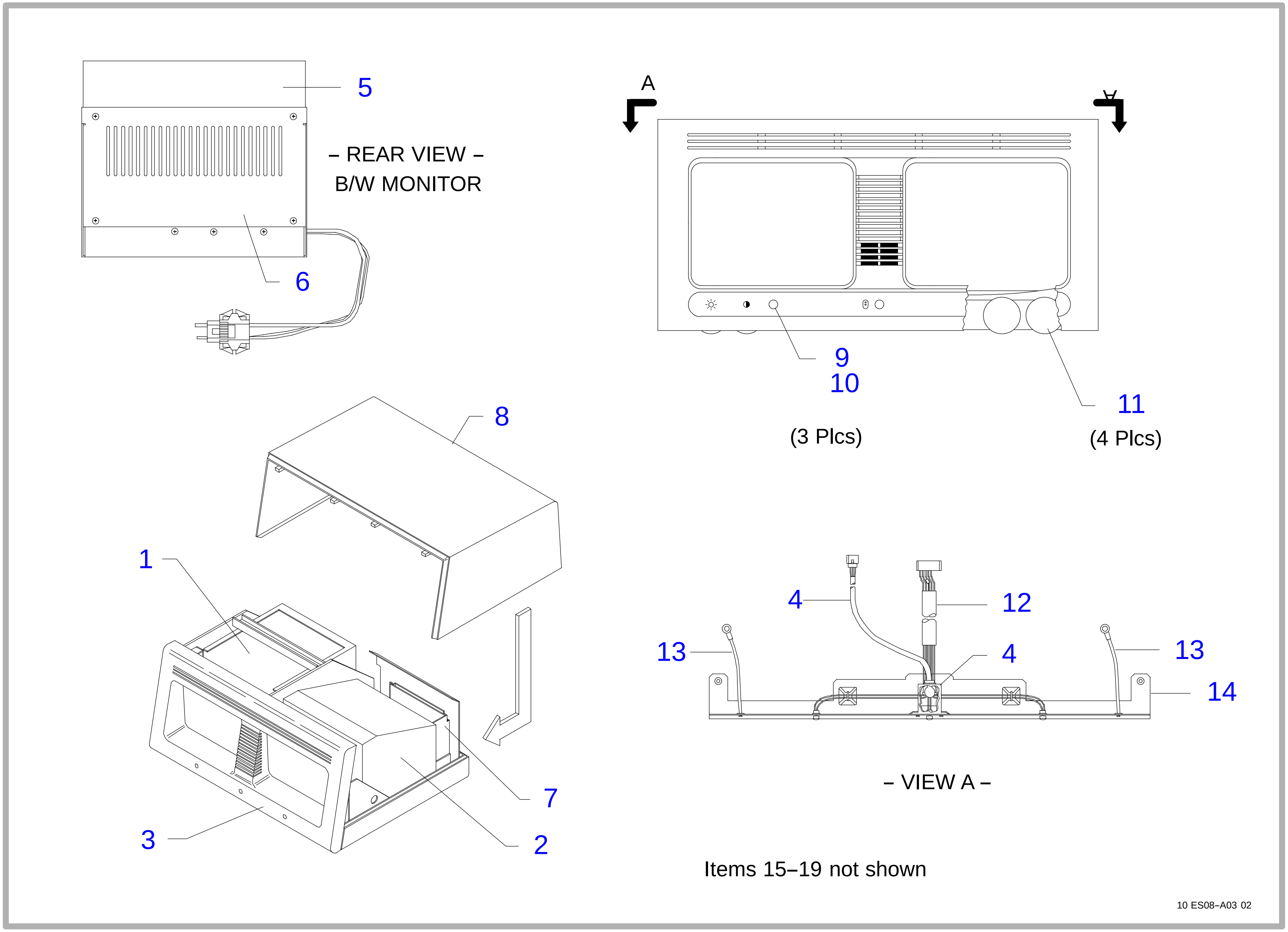


Figure 8–2. Video Monitor Assembly

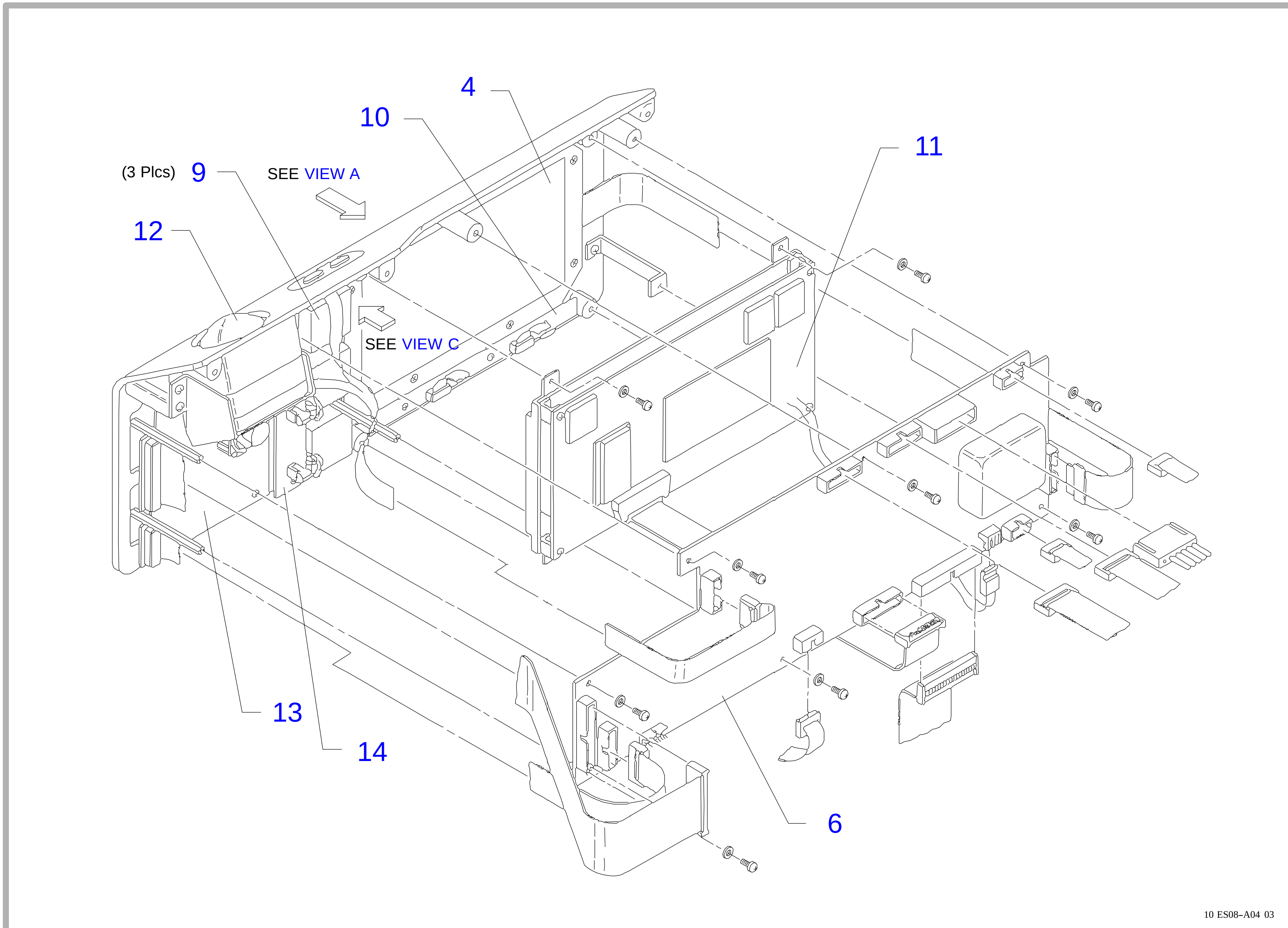


Figure 8–3. Control Panel (Sheet 1 of 2)

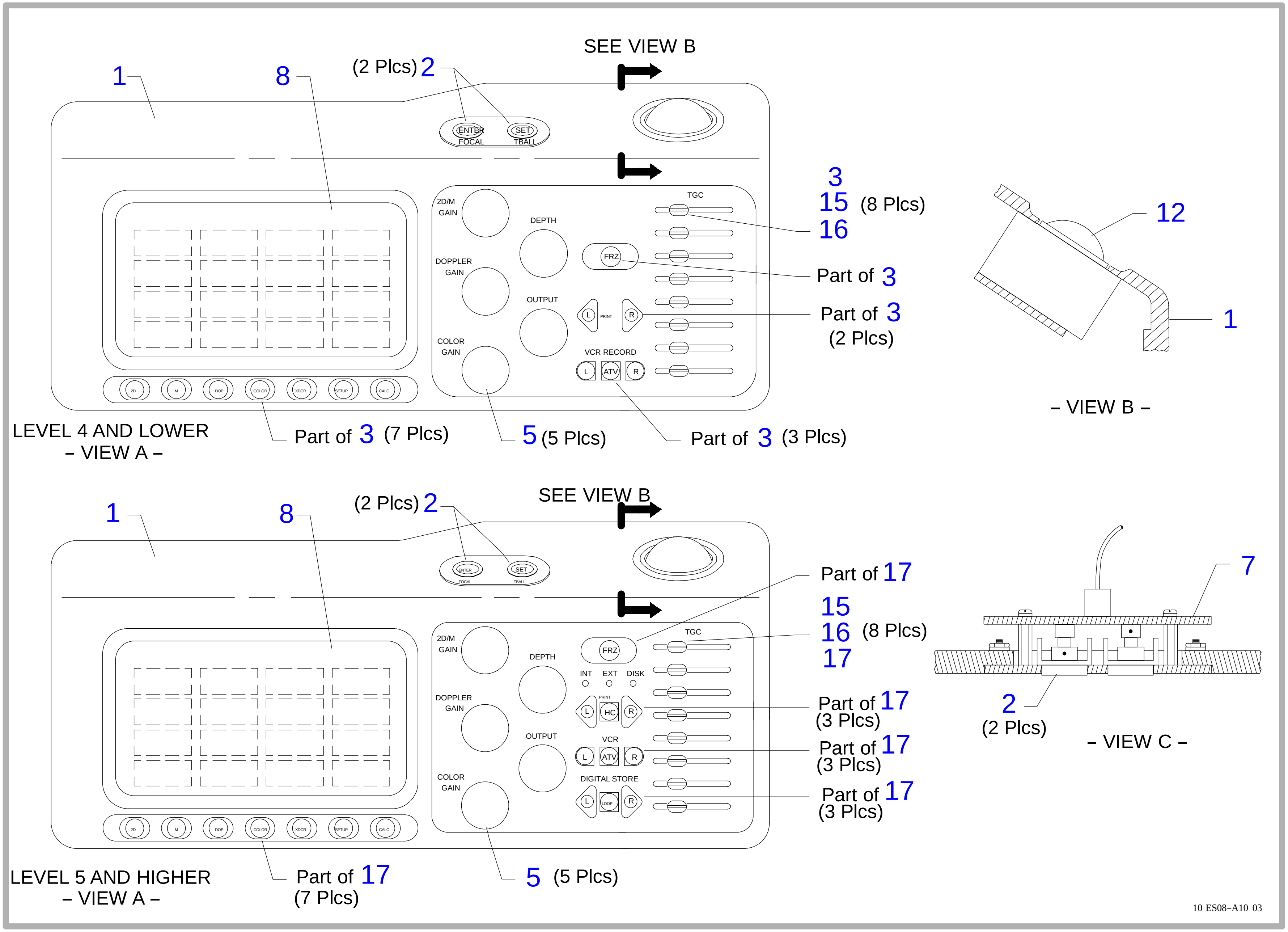


Figure 8–3. Control Panel (Sheet 2 of 2)

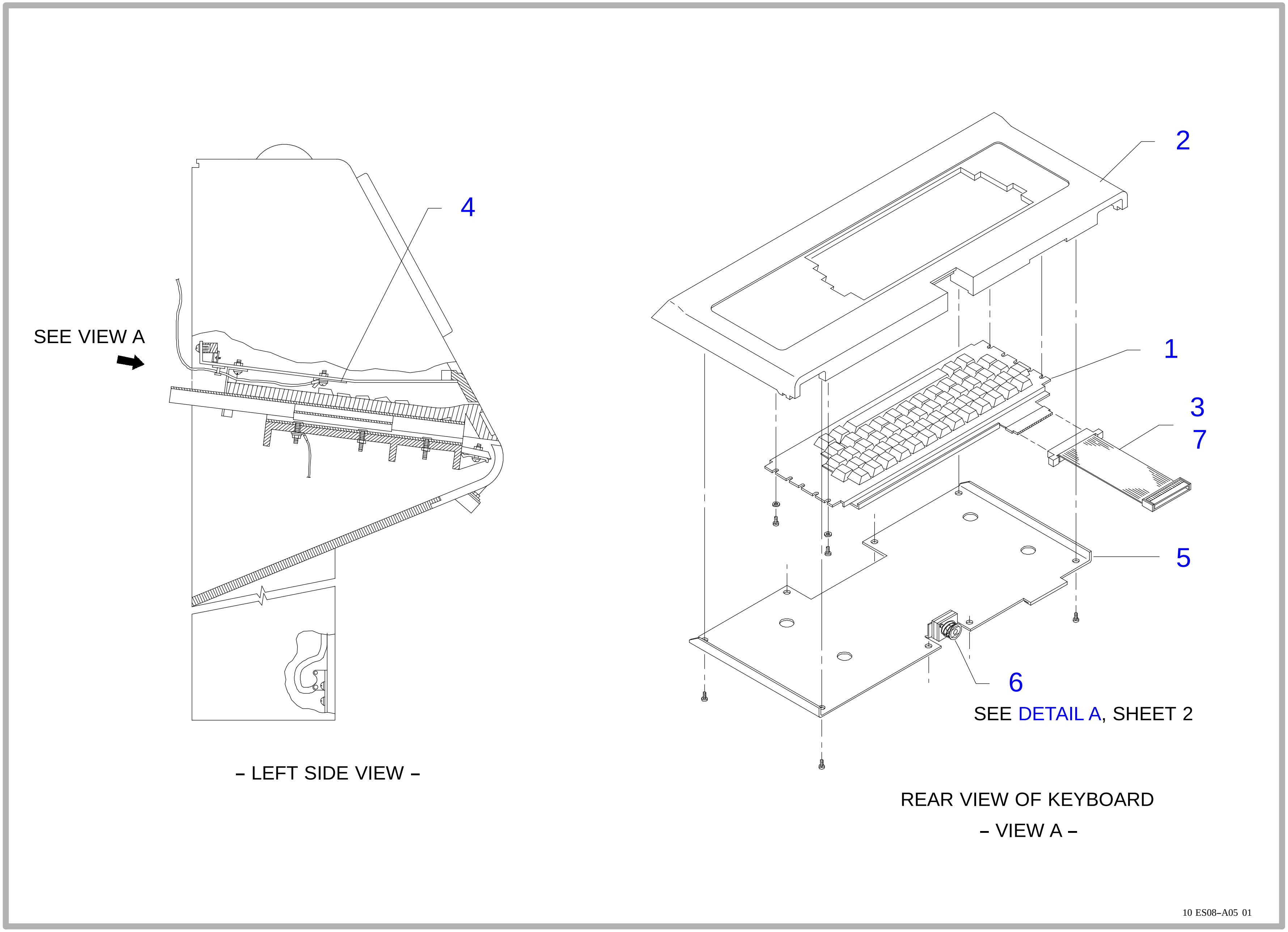


Figure 8–4. Keyboard (Sheet 1 of 2)

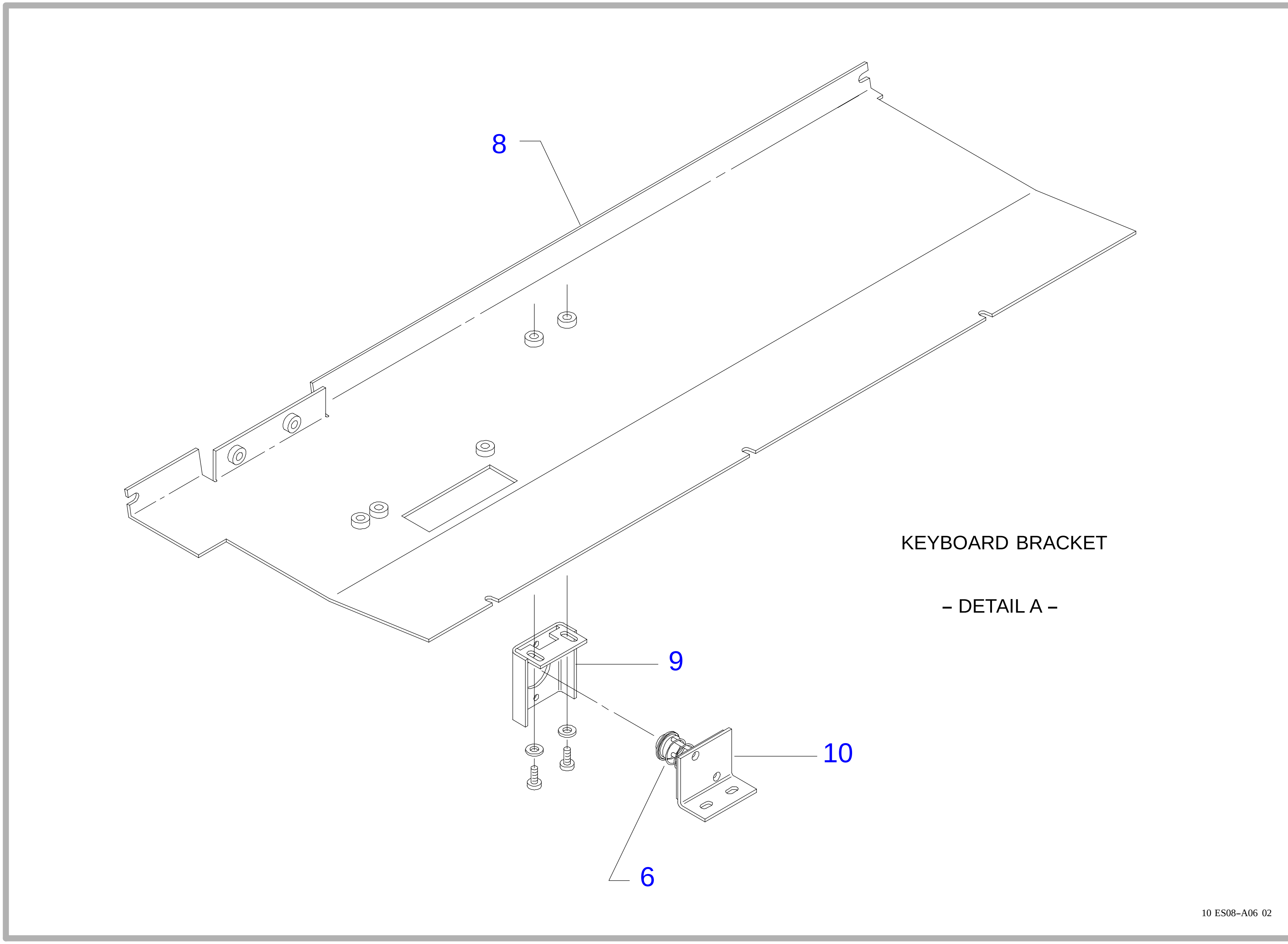


Figure 8–4. Keyboard (Sheet 2 of 2)

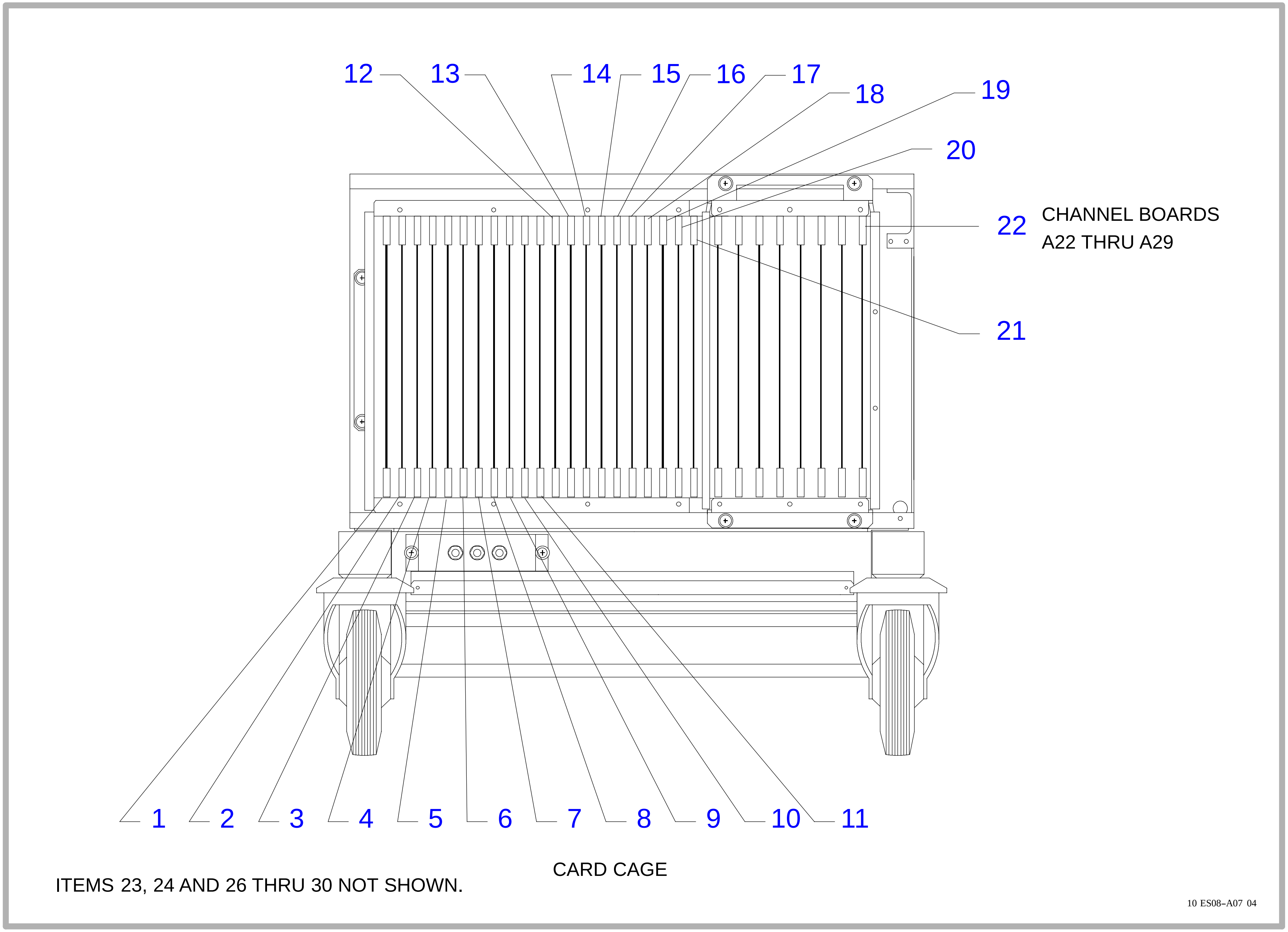
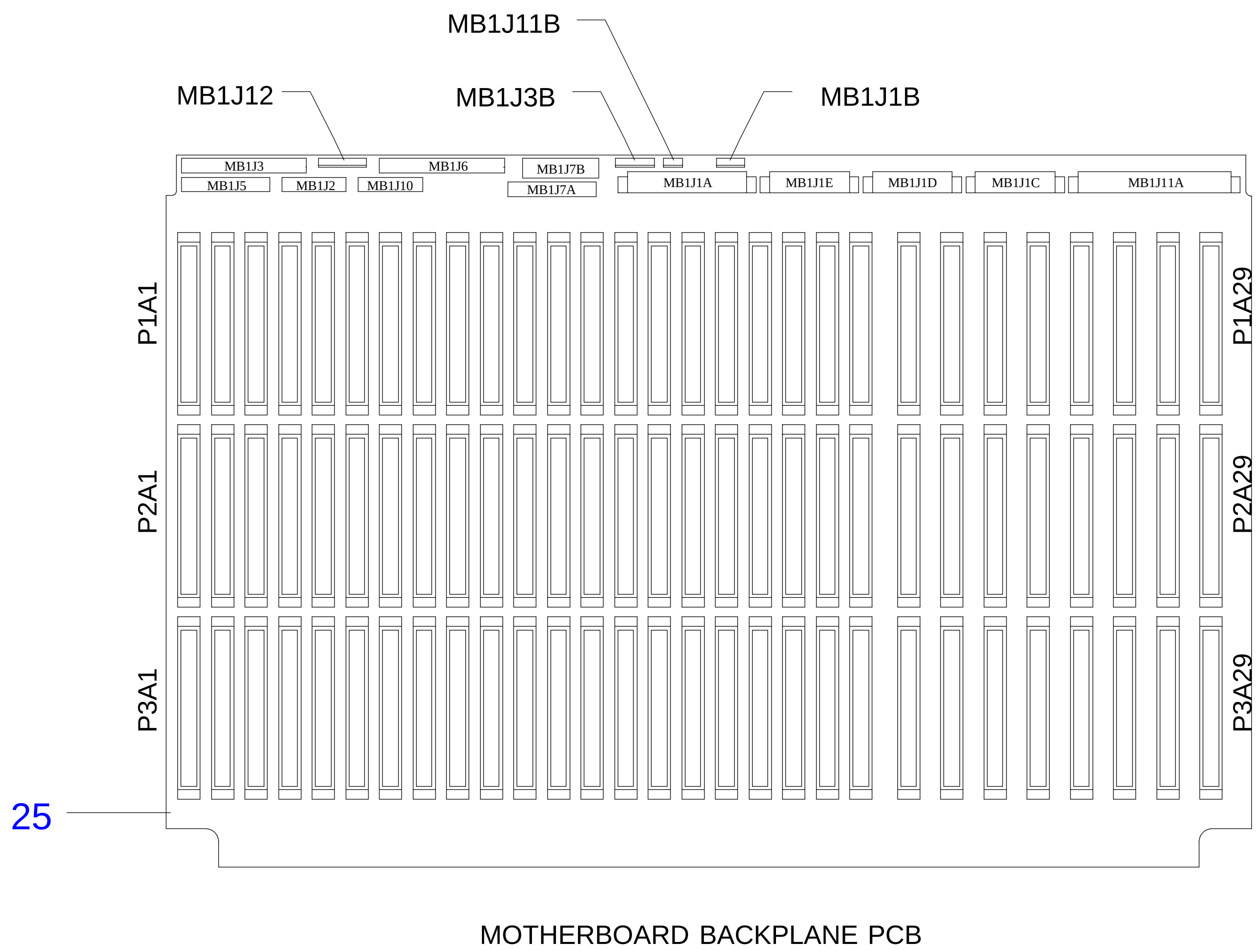


Figure 8–5. Card Cage Assembly with PCBs (Sheet 1 of 2)



NOTES: REFER TO SECTION 5A FOR PCB SLOT LOCATIONS
FOR OLD MOTHERBOARD, NEW MOTHERBOARD, AND LEVEL 4 SYSTEMS.

10 ES08–A13 01

Figure 8–5. Card Cage Assembly with PCBs (Sheet 2 of 2)

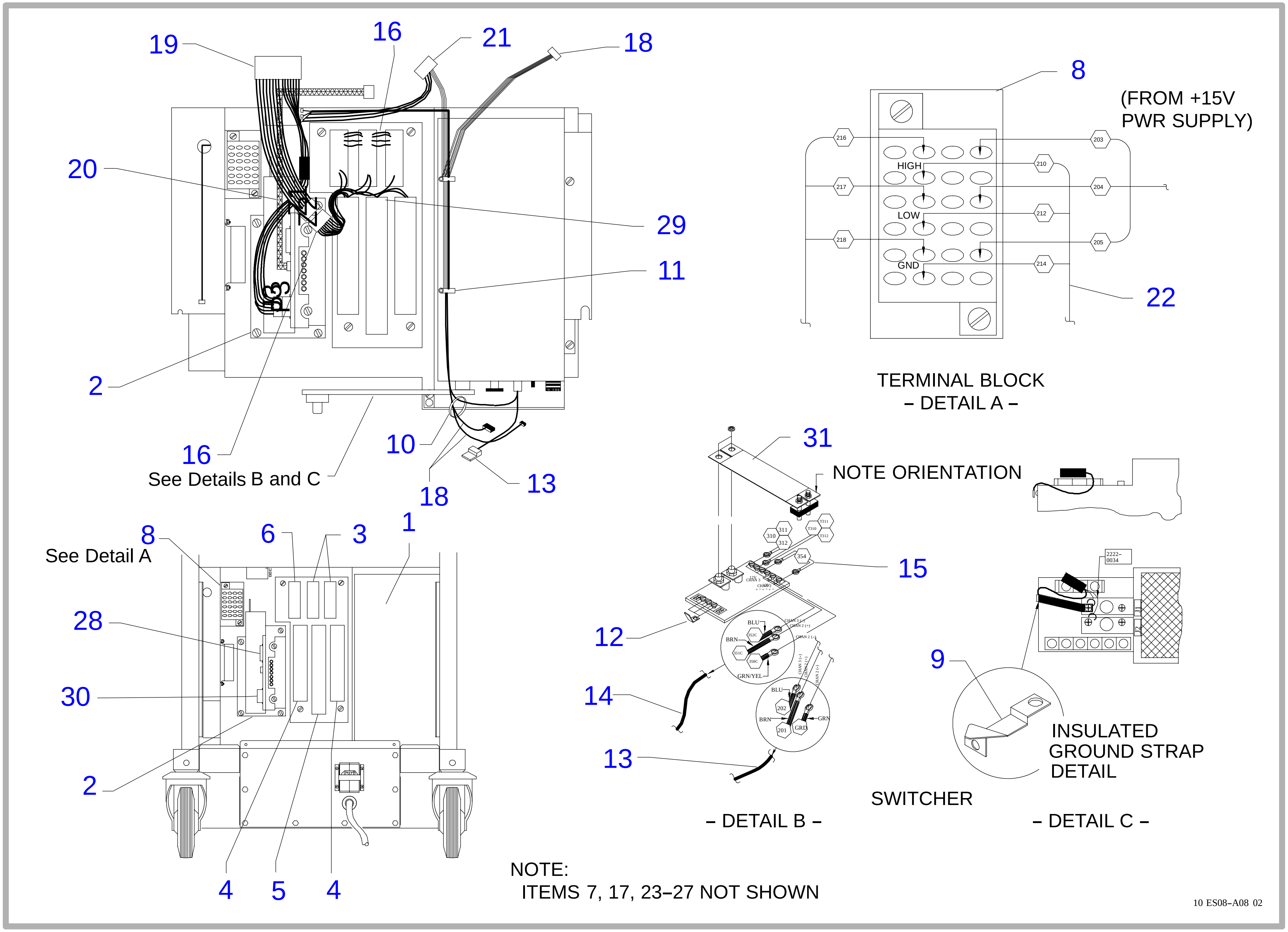


Figure 8–6. Power Supply Assembly

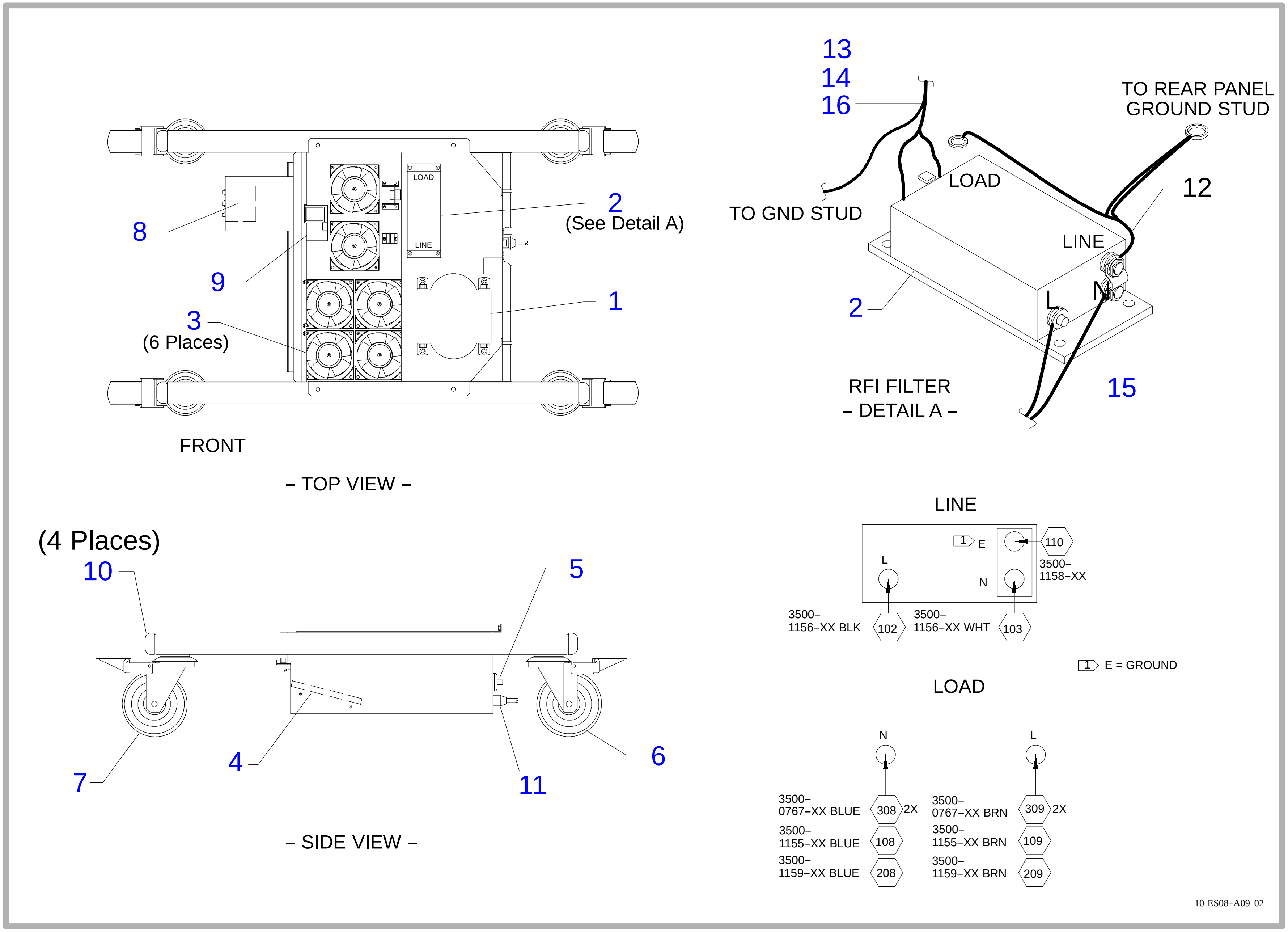


Figure 8–7. Transformer Assembly and Details

9 Reference

Reserved for Reference information